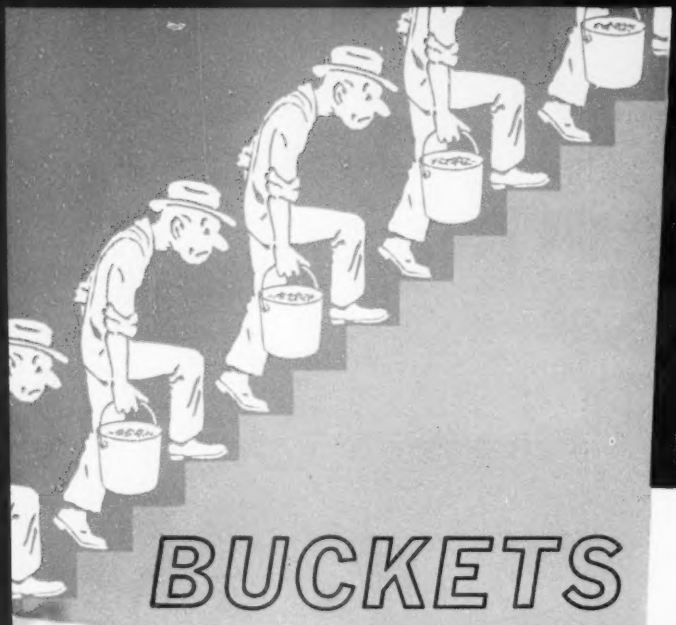
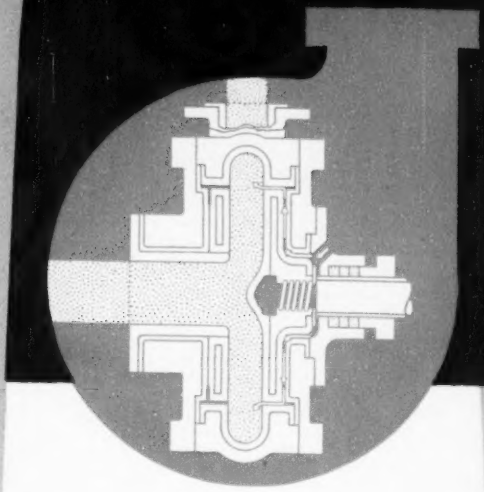
A McGRAW-HILL PUBLICATION

MARCH 1952
PRICE FIFTY CENTS

FOUNDED
1866

INSIDE THE WORLD'S LARGEST TRUCK SHOP

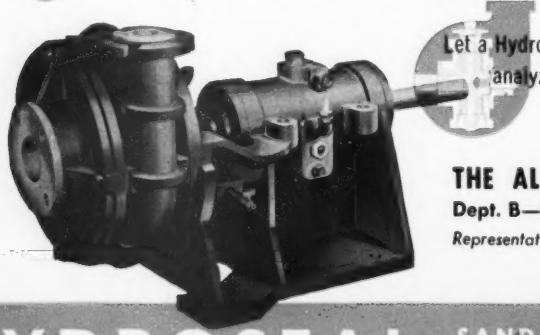




BUCKETS *or* PUMPS ?

Until recently, bucket elevators have been handling ball-mill discharge, but more and more engineers are changing over to Hydroseal Pumping Systems. Here's why:

1. **They can be installed for less than half as much money**
2. **Maintenance and power costs are appreciably lower**
3. **Installation requires less space and is more flexible**
4. **Standby provisions prevent crippling shut-downs**



Let a Hydroseal abrasives-handling engineer analyze your problem . . . chances are, he can help you solve it.

THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. B—259 E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

WANTED

More production with limited manpower

IT CAN BE DONE!

. . . with faster drilling CARSET JACKBITS

Because they are tipped with Carboloy inserts—one of the hardest metallic substances known to man—Carset Jackbits drill the hardest rock with a *speed* and *efficiency* which cannot be approached by the finest steel bits.

For instance, Carset Jackbits drill 50% faster—last from 50 to 400 times longer—practically eliminate bit changes and double the life of drill steel. They eliminate tapered holes saving up to 30% on dynamite—permit longer steels and feeds—require much less maintenance—and boost tonnage as much as 50% or more.

These advantages all add up to a tremendous increase in footage per shift—*without increasing your drilling crews.* Remember Ingersoll-Rand offers a complete line of equipment and service for rock drilling. Take advantage of our highly trained and skilled personnel. There is an Ingersoll-Rand branch office and distributor near you. Write or call today.

CARSET JACKBIT

DRY WITH CARBOLOY INSERTS

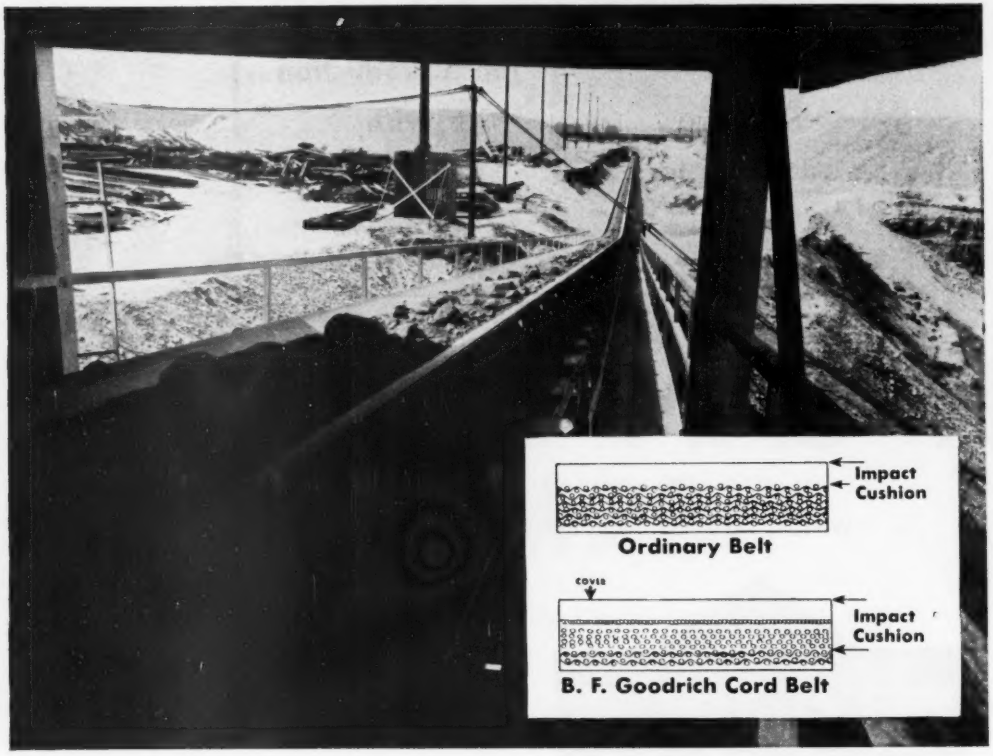
Ingersoll-Rand

11 Broadway, New York 4, New York

632-15

ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL & GAS ENGINES

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



Where rocks ride a subway to cut conveying costs

B. F. Goodrich cord belt solves a rock-handling problem

THAT B. F. Goodrich cord belt carries rock from a quarry to a crusher a half mile away. It travels underground part of the way, under a public highway and two sets of railroad tracks, delivering 1,000 tons of rock an hour. It's been doing it for 3 years now, and is good for years more service.

Where you have long centers, or heavy impact, or high lifts, or perhaps a combination of the three, the belt for the job is the B. F. Goodrich cord conveyor belt. Here's why:

Cord belt stands more impact — Each lengthwise cord in a B. F. Goodrich cord belt is completely surrounded by rubber — no cross threads tie them together. Cords are free to "give" when impact occurs. Rubber distorts temporarily, distributing and absorbing a shock that would damage other belts. As an extra protection, B. F. Goodrich has added a patented *Transcord Breaker* — an extra layer of parallel cords in rubber, placed across belt width. Acts as a shock absorber, stretches to prevent gouges and cuts from splitting belt cover.

Cord belt troughs better — There being no crossweave in the cord plies, cords are free to flex. Belt conforms to idlers, pulleys. Spillage is reduced, troughing is natural and belt keeps centered on idlers, sustains less damage, requires less maintenance.

Cord belts for tough jobs — So whether it's heavy rock — or chunks of iron ore, coal, dirt, or gravel — B. F. Goodrich cord conveyor belts can do the job better and for less. Your local B. F. Goodrich distributor will show you how this belt can save you money. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Conveyor Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

ENGINEERING AND MINING JOURNAL

VOLUME 153 — 86th YEAR OF PUBLICATION — NUMBER 3

MARCH, 1952

E&MJ Outlook 67
E&MJ Highlights 70
Market Summary 68
Editorial 71
World's Major Titanium Mine and Smelter Swing into Full-Scale Production ..... A. W. KNOERR 72
How To Stimulate Production of Base Metals in the Americas ..... C. W. WRIGHT 80
How a Bird's-Eye View Makes Prospecting Easier ..... ROSCOE J. WHITNEY 84
Mediterranean: A New Lead-Zinc Operation 87
Nicaro Resumes Production 88
Canada's D. P. Program ..... V. C. WANSBROUGH 91
New Large Alumina Plant Will Treat Jamaica Bauxite 94
Keeping Tab—Survey of Mining Practice (concluded) 98
Washington Impact 104
Personal News 110
Operating Ideas 106
New Products Digest 117
This Month in Mining 122

ALFRED M. STAEHLE, Publisher — **R. H. RAMSEY, Editor**

A. H. HUBBELL, Managing Editor; Associate Editors: J. B. HUTTL, San Francisco, A. W. KNOERR, H. L. WALDRON; Market Editor: H. H. WANDERS; Copy Editor: P. E. REED; Layout Editor: F. A. ZIMMERLI; Consultant: G. J. YOUNG; Washington: ARTHUR MOORE.

R. W. DAVIS, Advertising Sales Manager

Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder **Publication Office, 1309 Noble St., Philadelphia 23, Pa. Executive, Editorial and Advertising Offices: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y.** Curtis W. McGraw, President; Willard Chevalier, Executive Vice President; Joseph A. Gerardi, Vice President and Treasurer; John J. Cooke, Secretary; Paul Montgomery, Senior Vice President, Publications Division; Ralph B. Smith, Editorial Director; Nelson Bond, Vice President and Director of Advertising; J. E. Blackburn, Jr., Vice President and Director of Circulation.

Subscriptions: Address correspondence to Engineering and Mining Journal — Subscription Service, 1309 Noble St., Philadelphia 23, Pa., or 330 West 42nd St., New York 36, N Y. Allow ten days for change of address.

Branch Offices: San Francisco 4, 68 Post St.; Chicago 11, 520 N. Michigan Ave.; Los Angeles 17, 1111 Wilshire Blvd.; Washington, D.C., National Press Bldg.; Pittsburgh 22, 719 Oliver Bldg.; Detroit 26, 856 Penobscot Bldg.; Cleveland 15, 1510 Hanna Bldg.; Boston 16, 1427 Statler Bldg.; Philadelphia 3, 17th and Sansom Sts.; Atlanta 3, 1321 Rhodes-Haverty Bldg.; St. Louis 8, Continental Bldg. District Managers: New York, T. E. Alcorn; New York and New England, S. Kennedy; Philadelphia, W. A. Potter; Cleveland, W. M. Spears; Pittsburgh, H. C. Chellson; Chicago, C. J. Cash; San Francisco, J. W. Otterson; Atlanta, R. O. Maultsby; Los Angeles, C. W. Dysinger; St. Louis, F. W. Boots; London Address: McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, W.C. 2, England. Cable address: McGraw-Hill, London. Other McGraw-Hill foreign news offices in Paris, Berlin, Moscow, Prague, Shanghai and Mexico City.

A McGRAW-HILL PUBLICATION

ABP ABC

Member of Associated Business Publications and Audit Bureau of Circulations

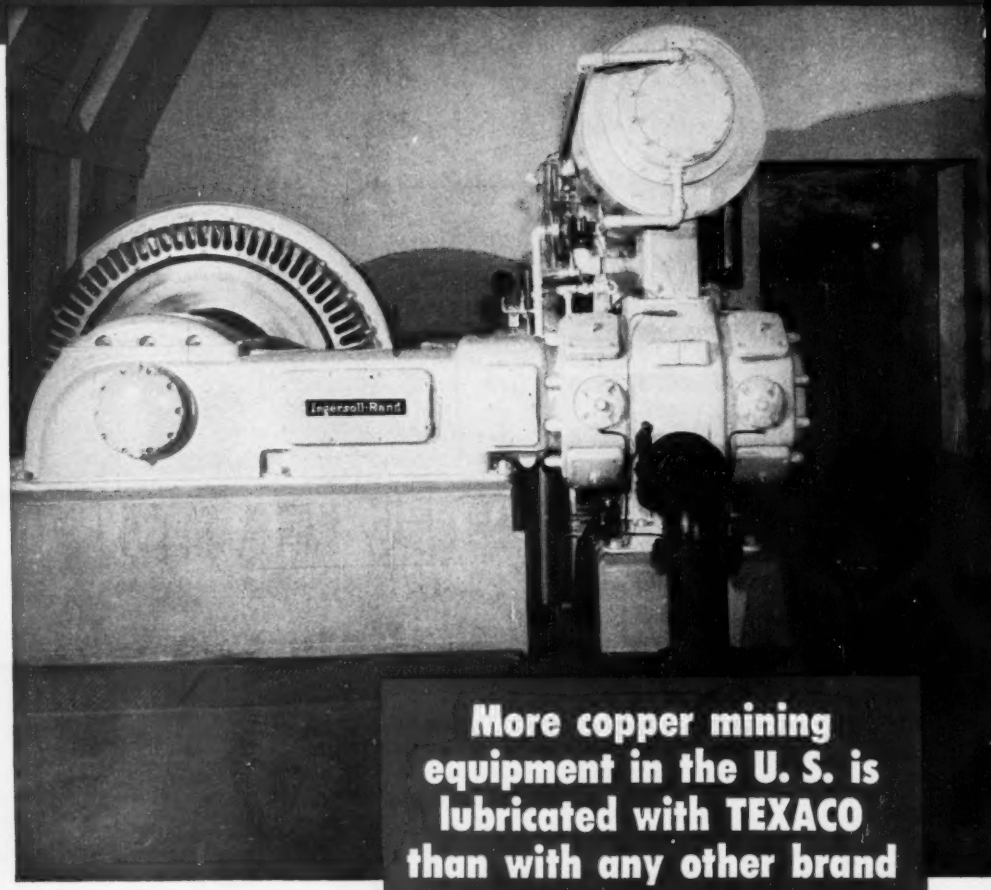
Price of this issue 50c. Subscription rates: United States and possessions, $3 a year, $4 for 2 years, $5 for 3 years. Canada, Latin America and the Philippines, $5 a year, $9 for 2 years, $10 for 3 years. Elsewhere $15 a year, $25 for 2 years, $30 for 3 years. **Please indicate position and company connection in all subscription orders.**

Entered as second class matter May 24, 1951, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

Copyright 1952 by McGraw-Hill Publishing Co., Inc.—All Rights Reserved. Printed in U. S. A.

Under ANY conditions...
with ANY compressor

MORE EFFICIENT



More copper mining equipment in the U. S. is lubricated with TEXACO than with any other brand

TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

TEXACO

TEXACO

PERFORMANCE...

when you use the recommended
Texaco air compressor oil

Whatever the size or type of your compressors or whatever the operating conditions, you can have a Texaco air compressor oil *exactly right* to step up performance and bring down your maintenance costs. Let a Texaco Lubrication Engineer survey your setup and recommend which to use. For example —

★★You can overcome rusting in compressors and systems by using a Texaco *rust-inhibited* air compressor oil.

★★You can eliminate the excessive wear caused by "wet cylinders" by using a Texaco *compounded* air compressor oil.

★★You can avoid the harmful carbon and gum that form under severe conditions by using a Texaco *heavy-duty* air compressor oil.

★★You can keep compressors clean and efficient in normal operation by using a Texaco *straight mineral* air compressor oil.

FOR YOUR ROCK DRILLS use *Texaco Rock Drill Lubricant EP.* This "extreme pressure" lubricant is your best protection against wear, your best guardian against rust whether drills are running or idle. Count on it for longer drill life and lower maintenance costs.

A Texaco Lubrication Engineer will gladly work with you to keep all your equipment in condition to produce more at lower cost. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.

Lubricants and Fuels
FOR THE MINING INDUSTRY

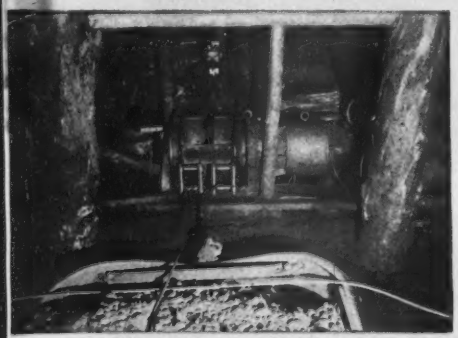
Faithfully yours 50 *for Fifty Years*

Here's why

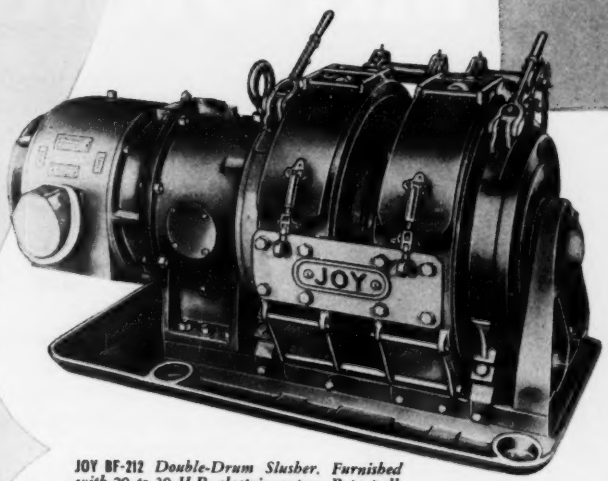
JOY AAF-211 *double-drum slusher in a lead-zinc mine. Mounted on a turntable, scrapes alternately from two headings.*

JOY AF-311 *three-drum slusher in a large open stope in a western copper mine.*

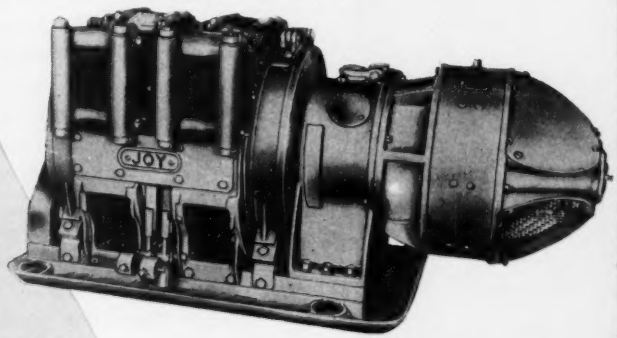
JOY AAF-211 *double-drum slusher in a cut-and-fill stope in a copper mine.*



JOY BF-211 *double-drum slusher pulling ore to a chute in a Michigan iron ore mine.*



JOY BF-212 *Double-Drum Slusher. Furnished with 20 to 30 H.P. electric motors. Rope pull, with drum half-full of rope, up to 3700 lbs.*



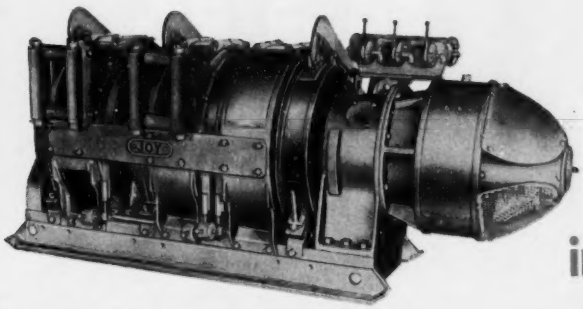
JOY CF-211 *Double-Drum Slusher. 30 to 60 H.P. electric motors. Rope pull up to 6800 lbs., with drum half full of rope.*

OVER 100 YEARS OF ENGINEERING LEADERSHIP

JOY

JOY SLUSHERS

set the standards for the industry



JOY CF-312 *Three-Drum Slusher equipped with air-clutch control for ease of operation. Electric motors from 30 to 60 H.P. Rope pull, with drum half-full of rope, is up to 6600 lbs.*

They're used and preferred in every mining field—because:

- ★ Their simple, compact design and rugged construction insure a long lifetime of trouble-free service under the roughest conditions.
- ★ The power unit can be easily removed, transported to the shop and overhauled without bringing the slusher above ground.
- ★ Automatic band-type brakes furnish retarding action, during unwinding, which eliminates backlash.
- ★ Open clutch bands dissipate heat quickly and permit easy inspection of linings. It's but a two-minute job to remove clutch for renewal of lining.

Joy Slushers are produced in over 300 types and sizes—from 3 to 150 H.P. Consult a Joy Engineer for the size and type best for your scraping job. ● *Write for Bulletin 76-Y.*

Have you seen this film?

"HARD ROCK MECHANIZED MINING"

16MM—Sound and Full Color—40 Minutes

Write for a FREE Showing

Address our Film Booking Office.

Consult a Joy Engineer

W&D M 4029

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

NEW!
SET!
TRIPPED!

DODGE

Tri-Matic Overload Release

FOR THE FAMOUS DODGE TORQUE-ARM SPEED REDUCER

1 *LOOSENS THE BELTS*

2 *CUTS OFF POWER*

3 *GIVES A WARNING*

Protects Your Machines

Mechanically . . Electrically POSITIVELY!

- The Dodge Tri-Matic Overload Release is a simple, positive acting unit that replaces the standard torque arm that is regularly furnished with the Dodge Speed Reducer. (The two are interchangeable.)
- Pressure exerted by an excessive load causes a piston to move lengthwise through the unit, activating the mechanism instantly.
- This movement shortens the torque arm, loosens the belts and cuts off current simultaneously.
- A warning system can be hooked up to the micro switch of the Tri-Matic—to activate bell, siren or light.
- The Tri-Matic is calibrated for adjustment to the load conditions of any job. It can be set to act at any desired load up to the reducer's maximum capacity.
- It is easy to reset the Tri-Matic. Just pull the speed reducer back into position. This automatically cocks the release mechanism.
- The Dodge Tri-Matic Overload Release is available from distributors' stocks in sizes for all Dodge Torque-Arm Speed Reducers —in either single or double reduction series.

DODGE

SIMPLE BODY-RELEASE LEVER WORKS *INSTANTANEOUSLY*

1 Body release lever is located at steering wheel, no reaching or stretching. Lever engages trip rod on Dumptor body . . .

2 Trip rod instantly releases latch hooks from body latch seat on the Dumptor chassis frame. Gravity dumps the load . . .

3 Body rolls on heavy-duty rockers. Snub chains attached to big coil-spring shock-absorbers check body at 70-degree tilt.

No body-hoist

GRAVITY DUMP cuts maintenance costs... speeds haul cycles

Koehring Dumptors have no slow-working body hoists. Trip the release lever and gravity dumps the 6-yard load in one second. It's as simple as that! No complicated mechanical hoists to slow up haul cycles . . . no expensive replacement parts, costly hoist maintenance or down time to eat into your profits. And gravity dump is instantaneous and trouble-free in all temperature extremes . . . never wears out.

No costly spring maintenance is another money-saving advantage you get with Koehring Dumptors. There is just one big, double-coil chassis spring on steering axle . . . none on driving axle. Extra-big, shock-absorbing drive tires eliminate need for more. You save spring maintenance time and replacement costs.

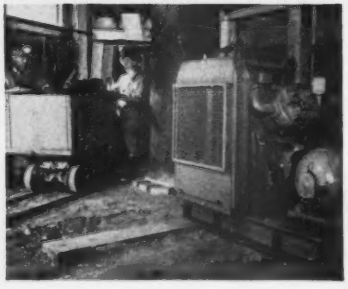
Check your body hoist and spring maintenance costs for a year . . . see how much you'll save by using Dumptors. What's more, Dumptor's no-turn shuttle haul and constant-mesh transmission for 3-speed travel forward and reverse, increases production . . . and your profits. See your Koehring distributor now for all the facts . . . or send today for informative 28-page Dumptor catalog.

KOEHRING COMPANY, Milwaukee 16, Wis.
(Subsidiaries:) JOHNSON • PARSONS • KWIK-MIX

4159

KOEHRING DUMPTOR®

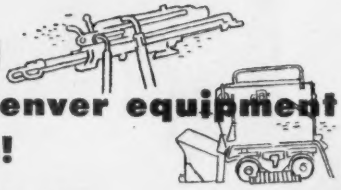
CRANES UP TO 79½ TONS LIFT CAPACITIES . . . EXCAVATORS UP TO 2½ YARDS



Throughout the whole world of mining . . .

In large mines and small—wherever men are mining iron or gold, copper or tin, bauxite or carnotite—Gardner-Denver quality is helping to boost production—helping to hold down mining costs.

you'll find Gardner-Denver equipment on the job!



In some of the deepest mines of the world—at elevations of 14,000 feet—near the equator—just below the Arctic Circle—under all sorts of working conditions, experienced miners prefer Gardner-Denver Drifters, Stopers, Sinkers, Jumbos, Slushers, Mine Car Loaders, Compressors, Pumps and other mining equipment.

and Gardner-Denver service at your call

Experienced service specialists are always available for consultation on your mining problems, for help in planning your Gardner-Denver installation, or an efficient maintenance program. Gardner-Denver Branch Offices and Dealers are located throughout the United States, Canada and the world. You're never far from a Gardner-Denver man who knows your mining problems and how Gardner-Denver equipment can help you solve them. Call on him today, or write us for his name and address.

GARDNER-DENVER

SINCE 1859

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

THIS SHOVEL HAS STOOD *the Rock Test!*

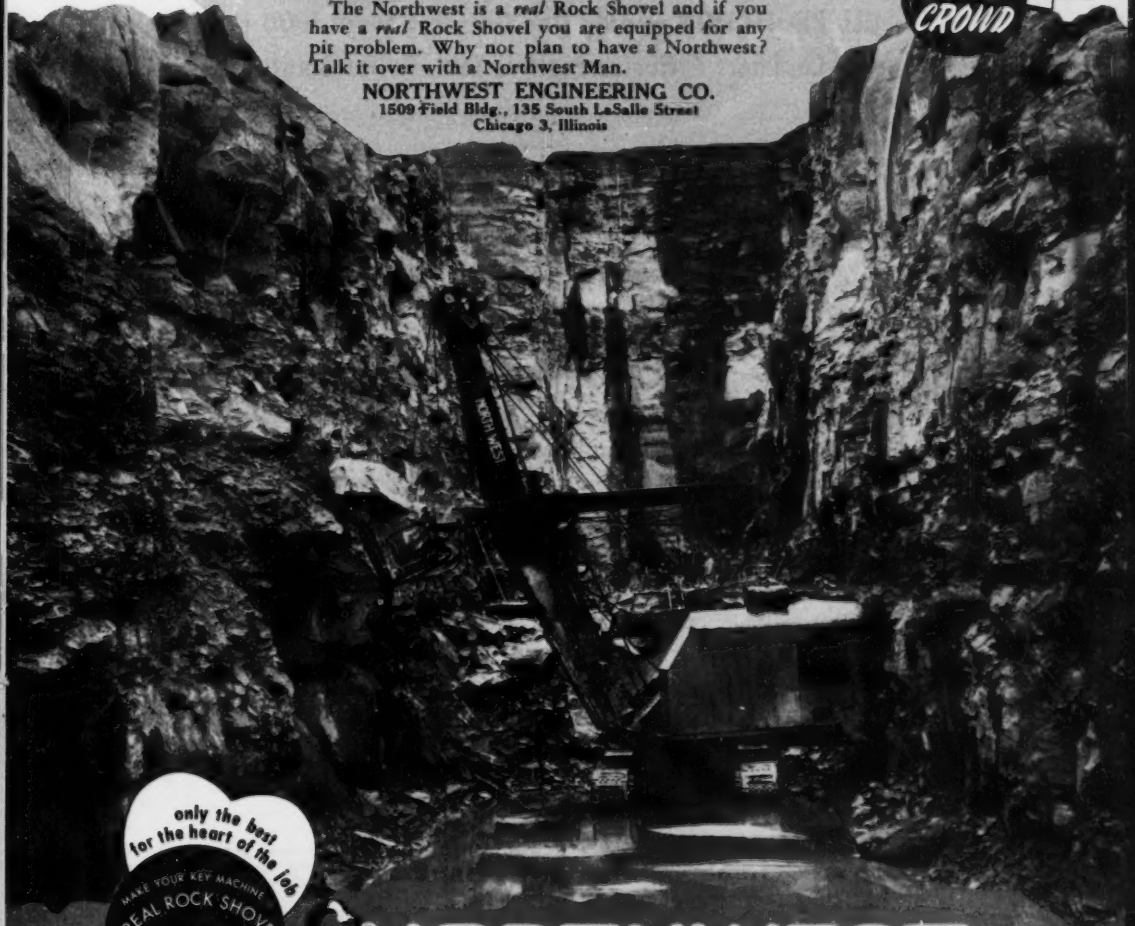
Here's a job that would test the metal of any equipment. Greater crowding force, smoothness of dipper control, easier operation, accuracy of spotting, are just a few of the advantages that Northwest equipment brings you. They are advantages that show up in all hard rock work. Northwests are serving on some of the largest mining operations in the country. In many cases their speed is outproducing slower, larger equipment and their simplicity of design and dependable construction eliminates the constant irritation of minor adjustments and breakdowns that increase down time and reduce output.

The Northwest is a *real* Rock Shovel and if you have a *real* Rock Shovel you are equipped for any pit problem. Why not plan to have a Northwest? Talk it over with a Northwest Man.

NORTHWEST ENGINEERING CO.
1509 Field Bldg., 135 South LaSalle Street
Chicago 3, Illinois

CAN YOURS?

INDEPENDENT CROWD *plus* AUTOMATIC CROWD
FOR GREATER DIGGING POWER
The DUAL CROWD



only the best for the heart of the job
MAKE YOUR KEY MACHINE A REAL ROCK SHOVEL
PROFIT

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

armed guards

proved very effective in increasing ore production in the old days. "Feather-bedding" was totally absent among Apache prisoners condemned to the ore mines of Mexico.

The Traylor TC Gyratory, with its curved concaves and ball head, is a perfect example of advanced crusher design. Bulletin 126 gives complete details.

THE PRODUCTION of ore has passed through many interesting and adventurous phases. For the past 50 years, Traylor has contributed to its growth and development. As the need for more efficient, more productive machinery increased, Traylor kept pace with constantly improved, more dependable equipment. By working with the mining industry for half a century, Traylor knows its problems . . . builds equipment "Traylored" to its needs.

Traylor

ENGINEERING & MANUFACTURING CO.

442 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • Los Angeles
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

A TRAYLOR LEADS TO GREATER PROFITS

Plenty of push

A dozen miles out of Cedar City, Utah, this "Caterpillar" Diesel D8 Tractor with matching No. 8A 'Dozer is slugging away on the roughest kind of job. Pushing iron ore into conveyor belts for loading into gondolas calls for plenty of brawn.

"This ore weighs 2½ tons to the yard," Superintendent Chris Mason of the Utah Construction Co., Cedar City, points out. "And when you buck it all day, day in and day out, and your equipment stands up—you have a good piece of machinery."

This "Cat" D8 Tractor and 'Dozer buck it eight hours a day, month after month, and there have been no repairs needed. That's why Superintendent Mason says, "For rough, hard work, when you're using 'Caterpillar' machines, you're using the best."

And just a few minutes' care each day will make even the *best* that much better—will keep your big yellow machines working harder and lasting longer. It's a good idea to consult your Operator's Instruction Book often. And call on your "Caterpillar" Dealer *before* wear can throw its punch. Proper maintenance today means full production tomorrow.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

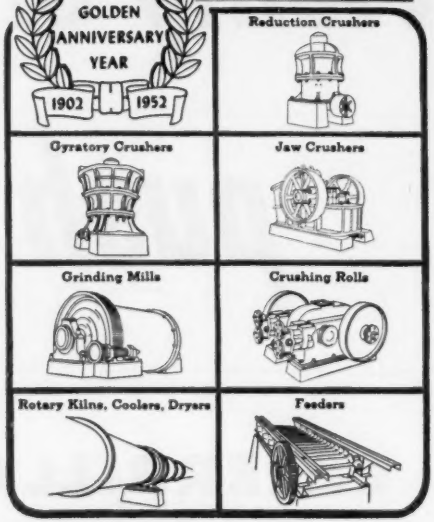
no more cars . . .

That was the problem faced 35 years ago by informed men in the automotive industry. They thought they could never produce over 900,000 cars per year. But today, car production runs in the millions.

The Traylor Type S Jaw Crusher features non-chokable smooth-faced curved jaw plates, which allow for greater capacity at finer setting and longer life of wearing plates. Seven sizes. For complete details, ask for Traylor Bulletin 128.

Fifteen years *before* this crisis in the automotive business, Traylor was busily developing better equipment to increase ore production. For 50 years, Traylor has worked to extend its lead in building the equipment needed by the mining industries. Modern mining depends on the constant improvement of machinery to maintain peak operating efficiency. With half a century of experience, Traylor stands ready to meet this need.

OUR GOLDEN ANNIVERSARY YEAR
1902 1952



Traylor

ENGINEERING & MANUFACTURING CO.
432 MILL ST., ALLENTOWN, PA.

Sales Offices: New York • Chicago • Los Angeles
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

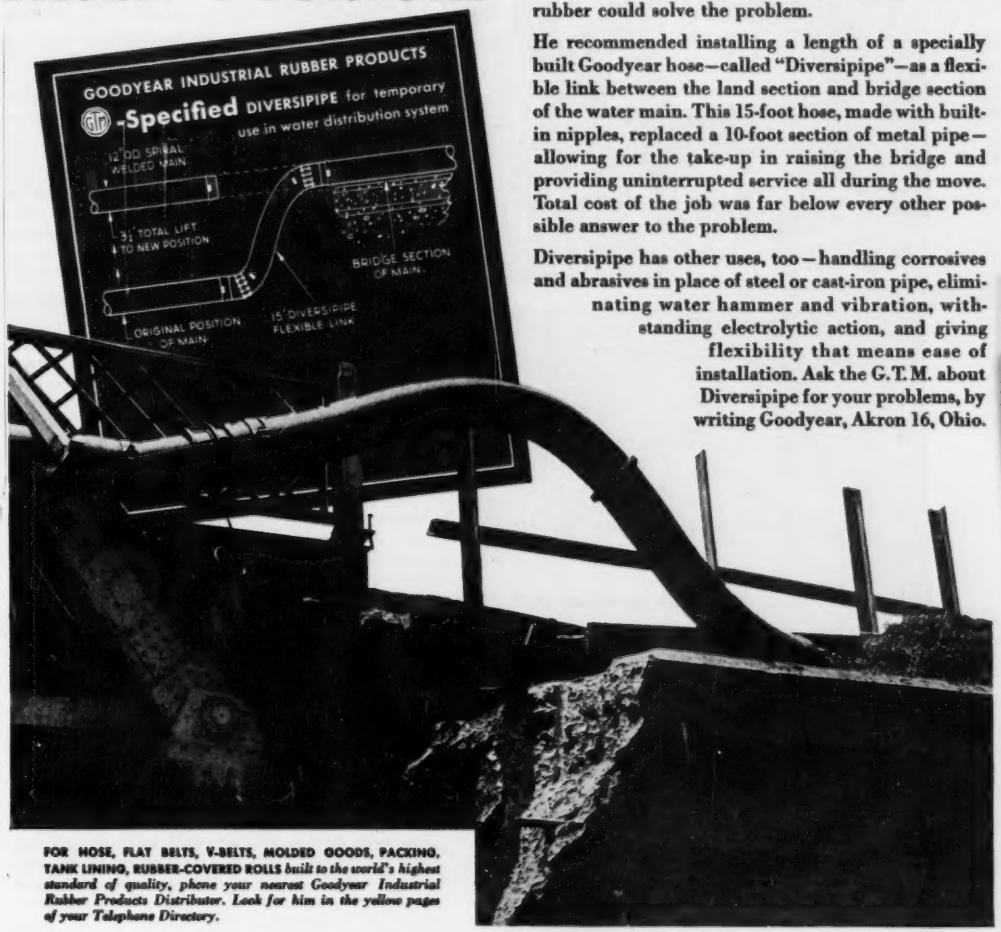
A TRAYLOR LEADS TO GREATER PROFITS

Best Answer to the Main Problem

One end of the bridge you see here had to be raised 3½ feet during a highway-rebuilding project—then anchored at the new height on a new concrete abutment. Problem was this: the bridge carried a water line supplying 400 families, and interruption of service couldn't be allowed during the month and a half it took to do the job. So the project engineer called in the G.T.M.—Goodyear Technical Man—to see if rubber could solve the problem.

He recommended installing a length of a specially built Goodyear hose—called "Diversipipe"—as a flexible link between the land section and bridge section of the water main. This 15-foot hose, made with built-in nipples, replaced a 10-foot section of metal pipe—allowing for the take-up in raising the bridge and providing uninterrupted service all during the move. Total cost of the job was far below every other possible answer to the problem.

Diversipipe has other uses, too—handling corrosives and abrasives in place of steel or cast-iron pipe, eliminating water hammer and vibration, withstanding electrolytic action, and giving flexibility that means ease of installation. Ask the G.T.M. about Diversipipe for your problems, by writing Goodyear, Akron 16, Ohio.


GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified DIVERSIPIPE for temporary use in water distribution system
12" OD SPIRAL WELDED MAIN
3½' TOTAL LIFT TO NEW POSITION
BRIDGE SECTION OF MAIN
ORIGINAL POSITION OF MAIN
15' DIVERSIPIPE FLEXIBLE LINK

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

Looking for materials

Here is a high temperature, atmosphere furnace used for production brazing of automotive parts. These parts travel through on a cycle from cold, to 2100 F, to cold in 1 hour and 10 minutes. The fixtures holding the parts were formerly made of metal. These warped badly and the parts often stuck. Attempts to overcome the warping by increasing the thickness resulted in fixtures so heavy they absorbed a major part of the furnace heat and added to the load on the roller hearth. When replaced with Super Refractory fixtures, weight was sharply reduced, sticking was eliminated, and the new fixtures *outlasted the alloy about 5 to 1.* The Super Refractory fixtures, of course, cost much less, too.

This is a walking beam furnace (gas fired to 2000-2200 F) in which the bars being heated are periodically lifted and moved from one notch to the next. Step by step, they're walked through to the discharge end. The scalloped work-rests were originally made of alloy. These lasted 4 to 6 months, and almost every week the furnace had to be shut down to repair and straighten these rests. However, when Super Refractory rests were installed, the furnace ran *for 2 years* before the rests required *any* attention. Another full year of uninterrupted service was then obtained with only about 10% replacement. What's more, the initial cost of these rests was less than half the alloy's cost.

An interesting application of Super Refractories where little heat is involved, is this spray nozzle for acids. This particular nozzle is approximately 17" long, and 4" in diameter. Nozzles of this type are used for a variety of different acids. A typical application is in a sulfuric acid plant where weak sulfuric acid is sprayed into an absorbing chamber. The temperature of the sprayed acid is only about 200 F, whereas the temperature of the gases being absorbed is much higher. Therefore, these nozzles have to be made of a material that will not only withstand chemical attack, but also take the shock of this sharp temperature gradient — a job that's made to order for Super Refractories.

Super Refractories by

CARBORUNDUM

Trade Mark

Refractories Division — The Carborundum Company, Perth Amboy, N. J.

"Carborundum" is a trademark indicating manufacture by The Carborundum Company

to replace alloys?

Great strength, plus resistance to abrasion, corrosion and heat, make Super Refractories ideal replacements for many heat resisting metals.

Possessing properties seldom associated with refractories, Super Refractories by CARBORUNDUM have proved superior to metals in many applications. They have been particularly valuable where critical chrome, nickel or cobalt alloys were involved.

For example, Super Refractories have replaced metals for such diverse applications as: skid rails, muffles, wire guides, radiant tubes, roller hearths, brazing fixtures, recuperator tubes, etc. In these cases, they not only released vitally needed metals but outperformed them (by lasting longer than the metals — while also increasing the capacity of the equipment).

As you look over the properties of Super Refractories listed below, draw a mental comparison with your needs. Exactly what makes an alloy essential in this place, or that? Is it refractoriness? conductivity? abrasion? corrosion? strength? It's surprising how often you'll find Super Refractories inherently better — and far less expensive — then metals.

It will pay you to investigate these unique Super Refractories . . . now, before the metals cupboard is bare. Your problem will be given prompt attention.

THESE SUPER REFRACTORIES ARE IDEAL WHERE

HIGH HEAT IS INVOLVED. Super Refractories are very strong and durable — can be safely used at temperatures over 3000 F. Compare this with 25-12 chrome-nickel steel, for example, which loses strength rapidly over 1500 F. and cannot be used with safety above approximately 2100 F.

ABRASION IS PRESENT. Two types of Super Refractories are within one index point of diamond hardness! They are the toughest known materials for large scale commercial use. They will distinctly outwear metals—especially at furnace temperatures.

HEAT CONDUCTIVITY IS NEEDED. At elevated temperatures, one Super Refractory material conducts heat *almost as rapidly as chrome-nickel steels.* It's widely used in equipment involving heat transfer. There are also Super Refractories which are good insulators, particularly at high heats.

STRENGTH IS IMPORTANT. Super Refractories are generally very strong, and *retain* their strength at temperatures where metals become unusable. For example, the modulus of rupture of one composition averages 3100 psi, at 2460 F. No commercial tonnage refractories have greater strength.

CHEMICAL ACTION IS PRESENT. In general, most Super Refractories are either neutral or acid in nature — are widely used where chemical inertness is important.

SPECIAL SHAPES ARE INDICATED. Practically all Super Refractories are available in a variety of special shapes molded to close tolerances—including fitted joints, tubes, etc.

USE THIS BOOKLET TO CHECK UP. This new booklet contains an easy-to-read analysis of the principal characteristics of these unique Super Refractories. The coupon will bring you the story—or one of our engineers will be happy to talk over your problems. We believe it could be mutually profitable.

Dept. U-32
Refractories Div., The Carborundum Co.
Perth Amboy, New Jersey

Please send me your free booklet on the properties of Super Refractories.

Name_____

Position_____

Company_____

Street_____

City_____ Zone_____ State_____

EXTRA TOUGH CARCASS
for extra strength and dependability

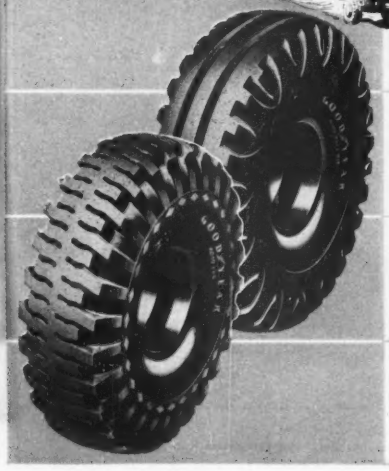
EXTRA THICK UNDERTREAD
protects against bruising

TOUGH LUG BARS
armor tread, sidewalls against cuts

SELF-CLEANING TREAD
provides exceptional traction

IT PAYS TO BUY AND SPECIFY GOODYEAR!

Super-tough is right! That's why cost-conscious pit and quarry men depend on Goodyear's Hard Rock Lug for finest performance at lowest cost per yard.



That's why — **MORE TONS ARE HAULED ON GOODYEAR TIRES THAN ON ANY OTHER KIND!**

HARD ROCK RIB
Companion tire for front wheels in rock work — easier steering, smooth rolling, same cord body, same shoulder and sidewall as Hard Rock Lug.

ROAD LUG
Remarkable dual purpose tire operates both OFF and ON the road. Combines off-the-road toughness and traction with on-the-road mileage and economy.

GOODYEAR

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

EIMCO

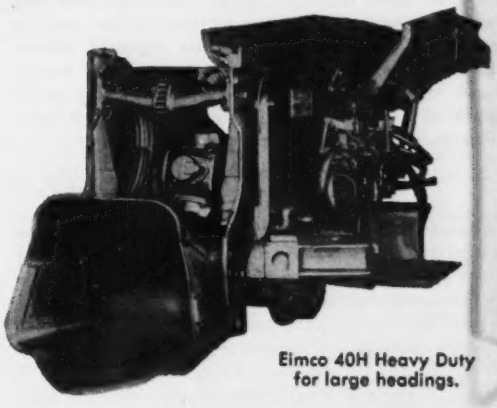
FOR PRODUCTION LOADING

"An Eimco loader is the most efficient tool underground." This statement made by mining men and contractors, with years of experience at their job, is an expression of complete satisfaction. They use their Eimco equipment continuously because it does their job better than anything else.

Eimcos are built to take the necessary long working shifts this type of work requires. The husky alloy-steel castings, shafts and gearing provide the needed extra strength and durability.

Eimcos use independent motor drives for each machine function. This means less power used in an intermittently operating machine. Costs less to operate.

Many other features of Eimcos make them the choice by the majority of the men working underground. Write today for information on the correct size Eimco for your job.



Eimco 40H Heavy Duty for large headings.

You Can't beat an Eimco

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 10, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES

NEW YORK 165 SOUTH STREET • CHICAGO 2119 SOUTH WALLACE STREET
BIRMINGHAM, ALA. 2151 FAYETTE AVE. • DULUTH, MINN. 324 E. SUPERIOR ST.
EL PASO, TEXAS, MILLS BUILDING • TERRELL, CALIFORNIA, P. O. BOX 340
KELLOGG, IDAHO, 107 D DIVISION ST. • LONDON W. 1, ENGLAND, 130 PICCADILLY

IN FRANCE SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND EIMCO (GREAT BRITAIN) LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

AND

Forminiere mechanizes

Cleaning the cut, maintaining haul roads, pusher-loading Tournapulls are just a few of the many jobs handled by Tournadozers at this Belgian Congo mine. In addition to their Tournapulls and Tournadozers, Forminiere uses a rear-dump 16-ton Tournarocker to haul diamond-bearing gravel.

At BAKWANGA, BELGIAN CONGO, mining engineers located vast new deposits of industrial diamonds under 30 meters (100 ft.) of sand, clay and loose rock. While the Bakwanga area has for years produced a large portion of the world's industrial diamond supply, older deposits, nearer the surface, had chiefly been uncovered by native hand labor. To remove economically the great depth of overburden on the new findings, the most efficient stripping method was necessary.

Remove 6,000,000 m³ of overburden with 14 LeTourneau earthmovers

Forminiere, acting for the owners of the Bakwanga Industrial Diamond Mines, carefully considered all types of earthmovers, then bought a fleet of 14 new LeTourneau machines to handle the entire 6,000,000 m³ (7,850,000 cu. yd.) project. Their 9 electric-control Tournapull-Scrapers drove 150 km. (93 miles) from the nearest railroad siding to the mine in 5 hours. Their 5 Tournadozers made the 150-km. trip under their own power in 8 hours.

5 Tournadozers, 9 Tournapulls speed clearing, stripping

Since arriving at Bakwanga, the machines have worked over 2000 hours each, through both rainy and dry seasons. The 9 high-speed Tournapulls load, haul, and dump overburden. Each of these self-propelled scraper units, driven by a native operator, moves 6 to 7½ loads, 45 to 56 m³ (59 to 73 cu. yds.) of sandy material hourly on a haul cycle of 1600 meters (1 mile).

Put work "far ahead of schedule"

The Tournadozers handle all pusher-loading, clear bush grass (often 3 meters, 10 ft., in height), level areas for stripping, and maintain haul roads. One of these versatile bulldozer units is also equipped with a sideboom crane for part-time lifting and repair work. So efficient has been this LeTourneau method that stripping is far ahead of schedule. Forminiere officials say their Tournapulls and Tournadozers move even more earth and at a lower-cost-per-meter than was originally expected.

If you have earth to move, ask your LeTourneau Distributor how these dependable machines can simplify operation, lower costs, and increase your production. He will be glad to help you analyze your equipment requirements or to put you in touch with the owner of the nearest available LeTourneau fleet. He is a good friend to know.

R. G. LeTOURNEAU, INC.

PEORIA, ILLINOIS

its diamond mining methods

...Scraper is pusher-loaded to capacity in ...seconds by a 186 h.p. Tournadozer. In this section of the mine, this 1 Tournadozer efficiently serves 4 Tournapulls which are hauling 800 meters (½-mile) one-way.

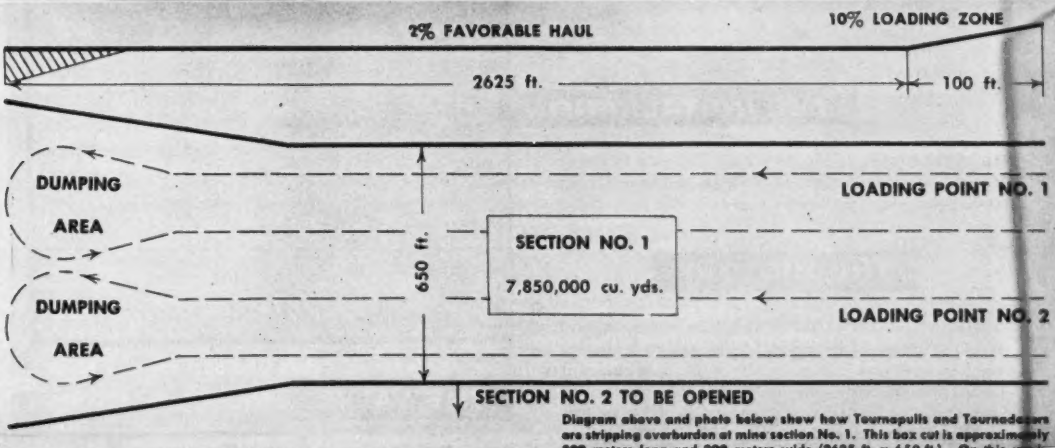


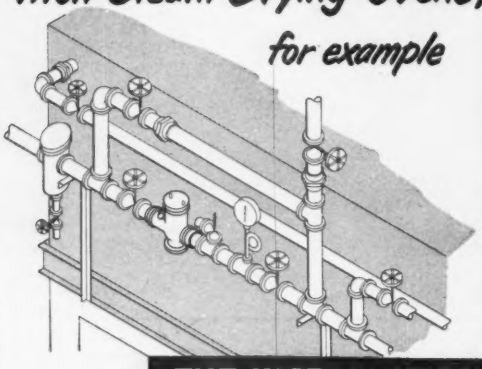
Diagram above and photo below show how Tournapulls and Tournadozers are stripping overburden at mine section No. 1. This box cut is approximately 800 meters long and 200 meters wide (2625 ft. x 650 ft.). On this work, Tournapulls travel at speeds up to 56 km./h. (35 m.p.h.).

HIGH-SPEED, RUBBER-TIRED HAULING • EXCAVATING • LIFTING EQUIPMENT

LET

Are Your Pressure Regulators Doing As Well?

...on Steam Drying Ovens, for example



THE INSTALLATION

In steam supply line to battery of 2 drying ovens at Ferro Chemical Corporation, Bedford, Ohio. Ovens individually controlled by thermostatic valves.

THE HISTORY

Specifications called for a valve to reduce initial steam pressure of 70 psi to 13 psi, and to maintain reduced pressure automatically without significant fluctuation whether one, or both, or neither oven is operated. Ovens to be operated at same or different temperatures, depending on process requirements.

Specifications were met with one No. 960 Crane Pressure Regulator, properly selected for capacity, and installed with adequate drainage of condensate.

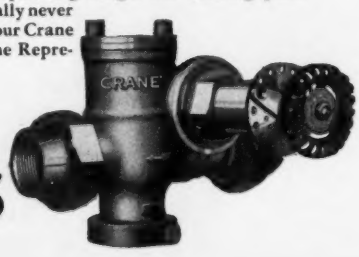
In service now more than 5 years without interruption, Crane Pressure Regulator is giving complete satisfaction. Working like new; maintenance cost to date: zero. Remarkably simple to adjust.

VALVE SERVICE RATINGS

SUITABILITY:	Does everything claimed for it
MAINTENANCE COST:	None; working like new
CORROSION-RESISTANCE:	Steam only - corrosion no problem
SERVICE LIFE:	In 5 years; no sign of wear
OPERATING RESULTS:	No fluctuation of oven heat
PRICE:	Good buy
AVAILABILITY:	Regular Crane item

THE VALVE

Crane No. 960 Brass Pressure Regulator reduces 250-Pound steam or air inlet pressure up to 80%. Available for operation at any of 4 pre-set ranges within 1 to 200 pounds outlet pressure. Adjusts easily within any set operating range. All wearing parts renewable; virtually never wears out. See your Crane Catalog or Crane Representative.



The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois

Branches and Wholesalers Serving All Industrial Areas

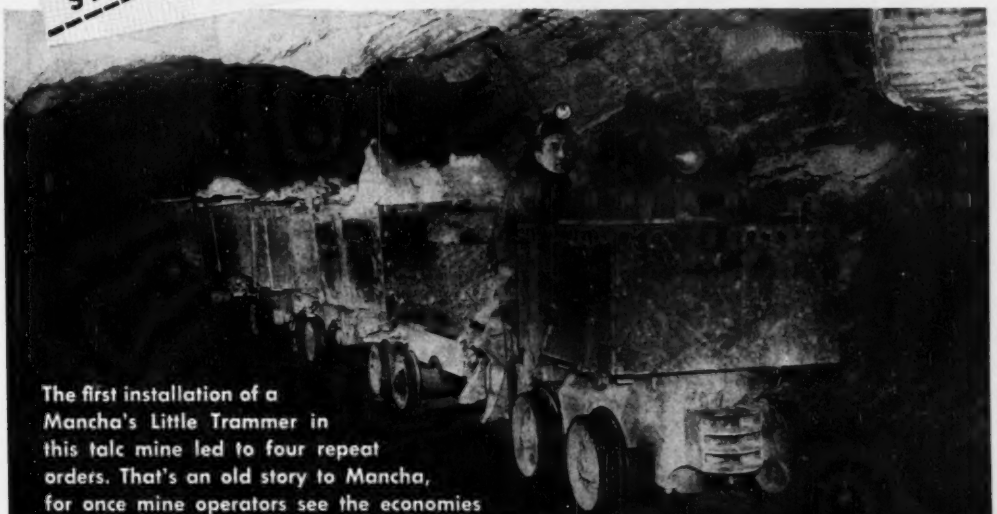
VALVES · FITTINGS · PIPE · PLUMBING · HEATING

SPEED UP HAULAGE
STEP UP PROFITS

. . . . . with **MANCHA'S**

LITTLE TRAMMER

A powerful 1½ ton storage battery locomotive known the world over for profitable haulage.



The first installation of a Mancha's Little Trammer in this talc mine led to four repeat orders. That's an old story to Mancha, for once mine operators see the economies they effect when they replace slow haulage methods with a Mancha's Little Trammer, they want to further increase those savings by putting more Mancha's to work, on a variety of haulage jobs.

Small enough for work in narrow, crooked drifts, powerful enough for difficult working conditions, Mancha's Little Trammer will perform profitably in your mine . . . for haulage duty, for moving mucking machines and drill jumbos, timber and supplies, or man trips to distant workings.

Will Mancha's Little Trammer pay in your mine?

Whether or not you are in the market for new haulage equipment

YOU CAN HAVE THE ANSWER NOW!

Mail the coupon today for our "mine haulage questionnaire." Return it to us with your answers and we will tell you how our Little Trammer will save you money as it does daily for scores of operators.

Mancha builds a complete line of storage battery locomotives. If the Little Trammer does not fully meet your job requirements we will recommend a locomotive that does.

Mancha Storage Battery Locomotive
Division GOODMAN Manufacturing Company
4850 South Halsted Street, Chicago 9, Ill., U.S.A.
E&MJ - 332

Send your haulage questionnaire.

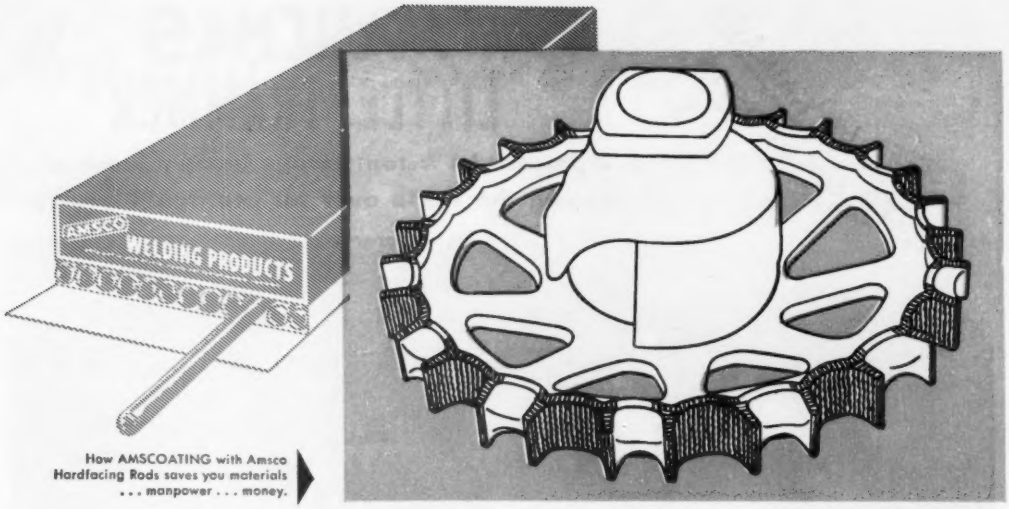
NAME _____

FIRM _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

MANCHA STORAGE BATTERY LOCOMOTIVE
Division **GOODMAN** *Manufacturing Company*
4850 SOUTH HALSTED STREET CHICAGO 9, ILL., U. S. A.



How AMSCOATING with Amsco Hardfacing Rods saves you materials . . . manpower . . . money.

These teeth take bites out of repair costs!

AMSCOATING can make old Tractor Drive Sprockets last 3 times longer than new.

Here's another way to beat the high cost of replacements, down-time and maintenance . . . AMSCOATING the teeth on Tractor Drive Sprockets. Time after time service records have shown that AMSCOATING of sprockets results in these dollar-saving advantages:

1. **On an average — *3 times the service life of a new, unhardfaced sprocket.***
2. ***2 out of 3 sprocket changes completely eliminated . . . far less down-time, less maintenance . . . more equipment out of the shop and on the job.***

To top it off, sprocket replacements can practically be eliminated. An AMSCOATED sprocket can be reclaimed over and over again . . . *at about half the cost of a new one!*

Get all the facts on how to make these big savings . . . write today for instruction sheet on AMSCOATING sprockets, and the name of your nearest AMSCO Distributor.

AMSCOATING...stands for control of wear by Hardfacing...

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

AMSCOATING

THE RIGHT WAY TO SAY HARDFACING

AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION

376 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

How Bucyrus-Erie Drills Give You

EXTRA DRILLING TIME . . .

Every Hour

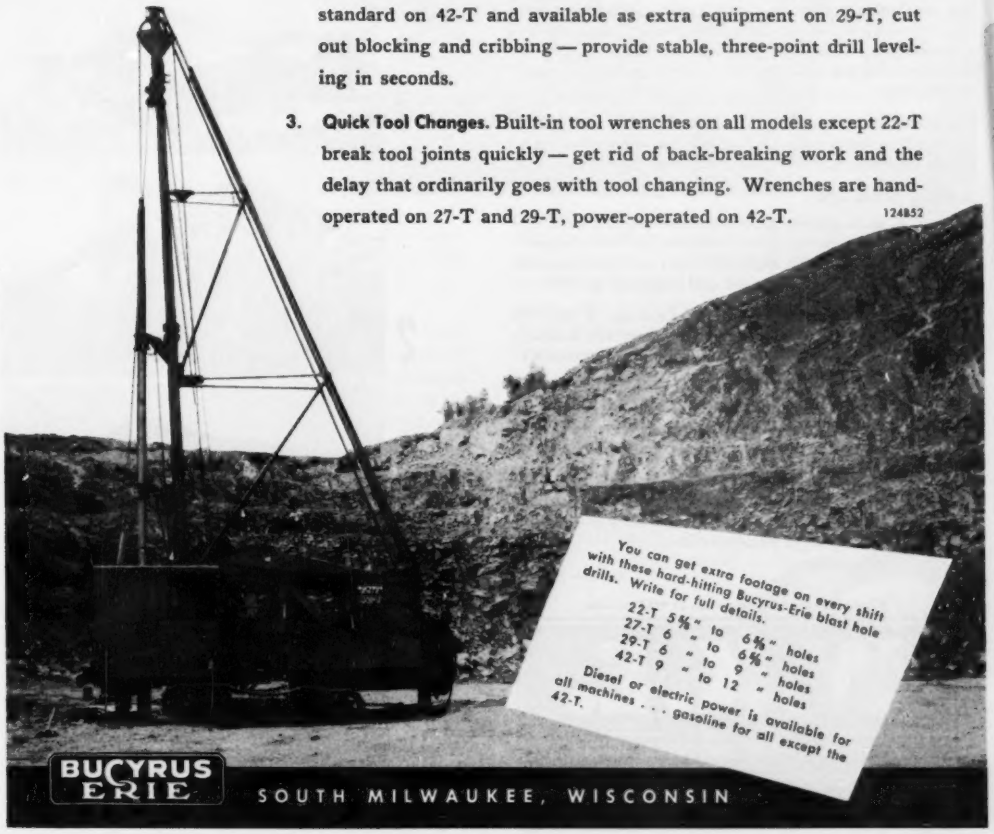
Hard-hitting Bucyrus-Erie blast hole drills cut waste time — spend more hours of actual drilling on every shift. Here are three big reasons why:

1. **Quick Moves.** Mobile caterpillar mountings permit quick moves — over rocky ground, through mud and sand, up steep grades. Steer just like a tractor. Controls are right at operator's station. Such mobility gives you extra time to make the most of the fast, rock-shattering Bucyrus-Erie drilling action.

2. **Quick Set-Ups.** Built-in leveling jacks eliminate time-wasting ground preparation — make possible quick, easy set-ups. Hydraulic jacks, standard on 42-T and available as extra equipment on 29-T, cut out blocking and cribbing — provide stable, three-point drill leveling in seconds.

3. **Quick Tool Changes.** Built-in tool wrenches on all models except 22-T break tool joints quickly — get rid of back-breaking work and the delay that ordinarily goes with tool changing. Wrenches are hand-operated on 27-T and 29-T, power-operated on 42-T.

124852



You can get extra footage on every shift with these hard-hitting Bucyrus-Erie blast hole drills. Write for full details.

22-T	5⅝"	to	6⅝" holes
27-T	6 "	to	6⅝" holes
29-T	6 "	to	9 " holes
42-T	9 "	to	12 " holes

Diesel or electric power is available for all machines . . . gasoline for all except the 42-T.

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

NOW IN OPERATION!

Triumph Mining Company's New WKE Built Selective Flotation Plant

WKE

This new lead-zinc Flotation Plant, located at Hailey, Idaho, recently commenced full-scale operations. Designed and constructed by Western Knapp Engineering Co., this newest addition to the industrial strength of America has a capacity of 200 TPD.

The extensive and specialized skills available in the WKE organization have been responsible for many other noteworthy additions to the nation's industrial capacity.

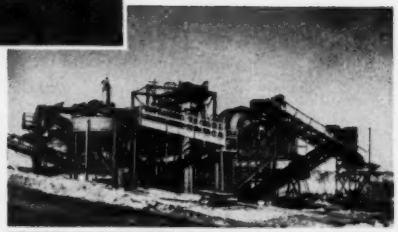
Among these are:

1. **W. S. MOORE CO.**, Virginia, Minnesota. A 150 TPH iron washing plant completed in 1951—included are an HMS Mobil-Mill and auxiliary washing facilities engineered and designed by WKE.

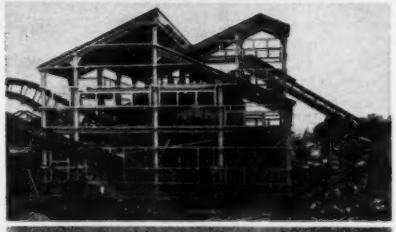
2. **HART & HART**, Providence, Kentucky. A 150 TPH HMS Mobil-Mill washed coal plant with auxiliary table treatment of fines—plant installation designed by WKE.

3. **BASIC REFRACTORIES, INC.**, Gabbs, Nevada. A 50 TPH HMS Mobil-Mill plant for processing brucite—engineered and designed by WKE.

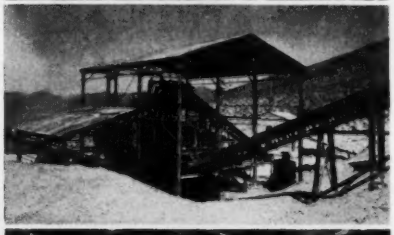
4. **DEL MONTE PROPERTIES CO.**, Pacific Grove, California. Design and engineering services for construction of a unique 50 TPH sand attritioning and selective flotation plant.



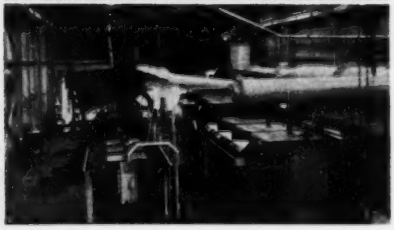
1



2



3



4

Write today for full information on WKE services.

W.K.E.

WESTERN KNAPP ENGINEERING CO.

DIVISION OF WESTERN MACHINERY COMPANY

760-766 FOLSOM STREET • SAN FRANCISCO 7 • CALIFORNIA

What He's Gained by Keeping Records on Wire Rope

This man buys and uses a lot of wire rope. For years he never knew exactly which brand was giving him the best service. Then he realized he'd better find out; it could save him important money.

So now he's keeping records on all his major ropes. He knows the date they go to work, the type of work they do, and just *how much* they do. His records enable him to check on different brands; they show him which make of rope is doing the biggest job per dollar spent. And he's wondering why he didn't adopt the system years ago.

Do you keep records like this? We at Bethlehem encourage the practice, for it's the only real way you can determine a "good buy" in rope. And when Bethlehem rope is involved in any comparisons you make, we naturally feel that it will soon demonstrate its basic soundness, durability, and all-around economy.

In every detail the Bethlehem product is made to the highest standards of quality. If it were not, we'd be foolish to suggest a means of comparison with other brands. But the plain truth is, Bethlehem wire rope will slug it out on any job you have . . . and your own records will prove it!

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

LET YOUR RECORDS TELL YOU!

Gates V-Belts are chosen to keep HELICOPTERS aloft!

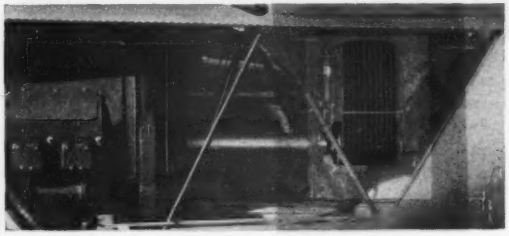
McCulloch Tandem-Rotor Helicopter

(Above) Two-place helicopter employs tandem-mounted, intermeshing rotors—a total of six rotor blades—powered by a 200-hp, six-cyl., aircooled horizontal engine installed at the rear. (Lower left) Gates-engineered V-BELTS, shown to rear of the engine, transmit power from the engine to the main drive shaft which in turn drives the reduction gearing for the rotors.

Because a helicopter is air-borne entirely by the turning of its rotors, McCulloch Engineers who designed this helicopter and supply it to the Navy had to be sure that the drive to the rotors was, above all, safe and reliable—a drive that would not fail when the helicopter was in the air.

The special difficulty in designing this drive was the extreme *compactness* required.

On small diameter pulleys and short center distances, the drive must handle 200 horsepower for 1000 hours at cruising speed and 500 hours at high speed. Ordinarily, it would have been impossible to achieve these results.



A Notable Application of Gates SPECIALIZED Research

However, Gates had developed a V-Belt which in thousands of applications had proved to have the exact characteristics required for this helicopter drive—and Gates had also developed design data which showed at once the applicability of this belt.

It was not by accident, therefore, that Gates Engineers were at once prepared to supply a V-Belt capable of handling this most exacting assignment and —in close co-operation with McCulloch Engineers—they developed the drive shown which has most successfully met all requirements.

Gates readiness to meet successfully *any* V-Belt Drive assignment is possible because Gates runs an *average* of 32,000 hours of testing *every week* on V-Belts alone! (32,000 hours is equivalent to *five years* of life for one belt.)

And the real value to you of such exhaustive testing is this: Laboratory findings are carefully checked by tests made under actual field conditions and the *results* are at once reduced to *usable data* for the design of V-Belt Drives to *perform whatever task may be required!*

Phone for a Gates Field Engineer

If you have a difficult drive to design, or if some drive in your plant is giving trouble, or if you only want to be sure what size and construction of V-Belts will give the most efficient and the lowest cost service on any particular drive—you have only to phone a Gates Field Engineer, *always near you* in all industrial centers.

Just look in your phone book under "Gates Rubber." A Gates Field Engineer will come right to your plant and put at your service the full benefits of Gates V-Belt knowledge and experience *without the slightest obligation!*

ENG-522

Gates VULCO ROPE DRIVES

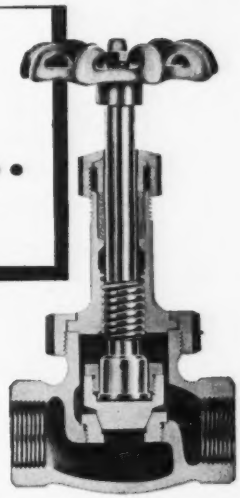
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

THE GATES RUBBER COMPANY

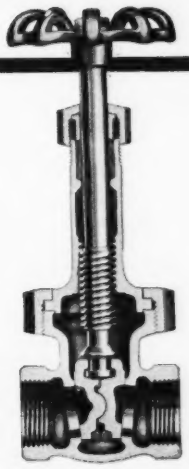
DENVER, U. S. A.

The World's Largest Makers of V-Belts

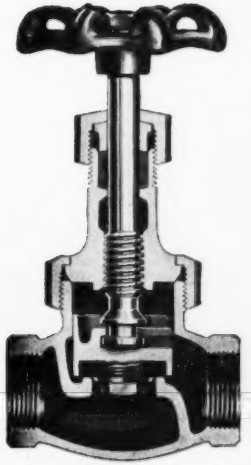
Walworth bronze valves...



Walworth No. 225P Globe Valve
500 Brinell Seat and Disc



Walworth
No. 29 Gate Valve



Walworth No. 95 Globe Valve
Re-New-Disc

built to give dependable trouble-free service on all recommended jobs

Walworth No. 95 Bronze Globe Valves (Angle Type: No. 96) are recommended for service where throttling is not required. They are rated at 150 psi working steam pressure, 500F; 300 psi cold water, oil or gas. The improved renewable disc and lock-on, slip-off disc holder — an original Walworth development—saves time and trouble. This valve can be repacked under pressure when fully opened. All parts are designed to give maximum service and strength.

Walworth No. 29 Bronze Gate Valves are rated at 200 psi working steam pressure, 550F; 400 psi cold water, oil and gas. These valves have rising stems and integral seats. Sizes 2-inch and smaller have union bonnets; sizes 2½ and 3-inch have bolted bonnets. Valves up to and including ¾-inch have solid wedge discs; 1-inch and larger have split wedge discs. These valves can be repacked under pressure when fully opened.

Walworth No. 225P Bronze Globe Valves (Angle Type: No. 227P) are rated at 350 psi working steam pressure, 550F; and 1000 psi non-shock service on cold water, oil and gas. The stainless steel, plug type seat and disc — heat treated to 500 Brinell — can be closed on sand, slag, scale and similar floatage, without injury to the seating surfaces. They are the longest wearing, TOUGHEST bronze valves you can buy.

For full information about Walworth Quality Bronze Valves, see your Walworth distributor, or write:

GLOBE

GATE

ANGLE

WALWORTH
valves and fittings

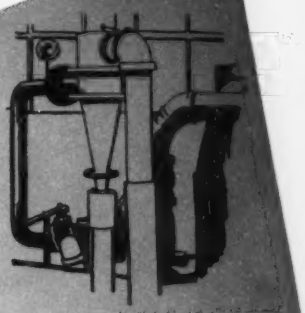
60 EAST 42nd STREET NEW YORK 17, N. Y.

CHECK

Here's the picture on REAGENTS AND PROCESSES for the difficult days ahead

Metal consumption both for re-armament and essential civilian use has yet to reach its inevitable all-time peak. But all production/consumption estimates now indicate that chemical beneficiation of greater tonnages from existing mines must be augmented by developing new, known ore-bodies. Thus, an assured supply of metallurgical chemicals and the application of improved processes are the very foundation stones of expanded metal output.

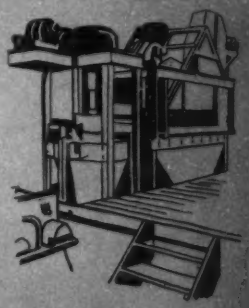
Long a leading industrial-chemical producer as well as an important source of reagents and treatment processes, Cyanamid has a mature understanding of the problems posed by a simultaneous upsurging demand for both metals and chemicals. Though no one can foresee, much less bind the future, Cyanamid has met and mastered similar problems in previous periods of world upheaval ... confidently expects to do so again.



When peace returns worldwide, we still expect to be able to say: No Cyanamid customer ever had to suspend production for lack of Cyanamid Reagents.

Specificially here is a high-spot inventory of what Cyanamid stands ready to provide its customers in every mining field:

REAGENTS As shown on the page opposite, Cyanamid offers a most complete line of cyanidation and flotation reagents. Notable specialized reagents have been added during recent years. Others are being aggressively researched. Production facilities are available for expected peak output.



PROCESSES With recent commercial operation of two Dutch State Mines Cyclone Separator plants to beneficiate iron ore fines in the ¼″ x 65 mesh size range, Cyanamid now offers proven processes for a wide variety of ores in all size ranges from 6″ to 0. These processes include: Heavy-Media Separation for 6″ x 10 mesh feed; Dutch State Mines Cyclone Separator for the ⅜″ x 65 mesh size-range, and Specialized Froth Flotation in the 65 mesh x 0 size range. Millions of tons of commercial experience with these processes, alone and in combination, have resulted in a tremendous fund of experience in their most efficient use.

TESTING AND APPLICATION SERVICE. Paralleling the growth of the Reagents and Processes offered, Cyanamid has simultaneously expanded its staff and facilities for technical service. To a greater degree than ever before, we can provide dependable, unbiased testing services prior to selection of the processes and reagent combinations needed to treat refractory ores. Likewise, we can give you practical on-the-mill help in applying recommended reagents and processes to your feed.

First step toward utilizing all the resources Cyanamid provides for its customers is a discussion of your problems and objectives with a nearby Cyanamid Field Engineer. Since he is in constant touch with headquarters, your letter or telephone call will bring his prompt and intelligent attention.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

Printed in U.S.A.

A Statement by Anaconda on the Copper Situation

MANY users of copper have vital decisions to make . . . usually in connection with the present defense-induced shortages of copper and aluminum. This statement is an effort to remove the smoke screen surrounding the copper picture . . . to wipe away the confusion caused by too much talk supported by too few facts.

Substitution poses problems – Industry has been urged to substitute aluminum and other materials for copper. In some instances this may be logical and practicable. In many others it is difficult, if not impossible. But – before making *any* long-term decisions that may cost a great deal of money in engineering, new plant facilities or rescheduling of production operations – one should know the facts about the future of copper.

New Anaconda projects – The first major increase in copper production will come from Anaconda when the Greater Butte Project and the new Sulphide Plant at Chuquicamata, Chile, begin operations this spring. By 1953, these two projects should raise present levels of copper production by about 95,000 tons yearly.

Toward the close of 1953, Anaconda's new Yerington project in Nevada is expected to start producing at an annual rate of 30,000 tons. By then, Anaconda will be adding to the present yearly copper supply at the rate of about 125,000 tons.

Other new projects – During 1954-55 still other new projects in the U. S. and friendly foreign countries will further augment the increasing copper supply. All told, it is estimated that by 1955, not less than 450,000 tons of copper could be produced annually – over and above present production levels.

Accordingly, in 1955-56, domestic production plus imports could bring the U. S. copper supply to 1,800,000 tons yearly. This would represent an increase of about 20% over present levels. Based on historical comparisons, and barring a large-scale shooting war, this amount of copper could support a Federal Reserve Board Index of Industrial Production of 270, an increase of 24% over the present, and 45% above the first half of 1950.

• • •

These are the 'things to come' in copper. On the basis of the facts there is no necessity for considering long-range substitution of other materials for the red metal.

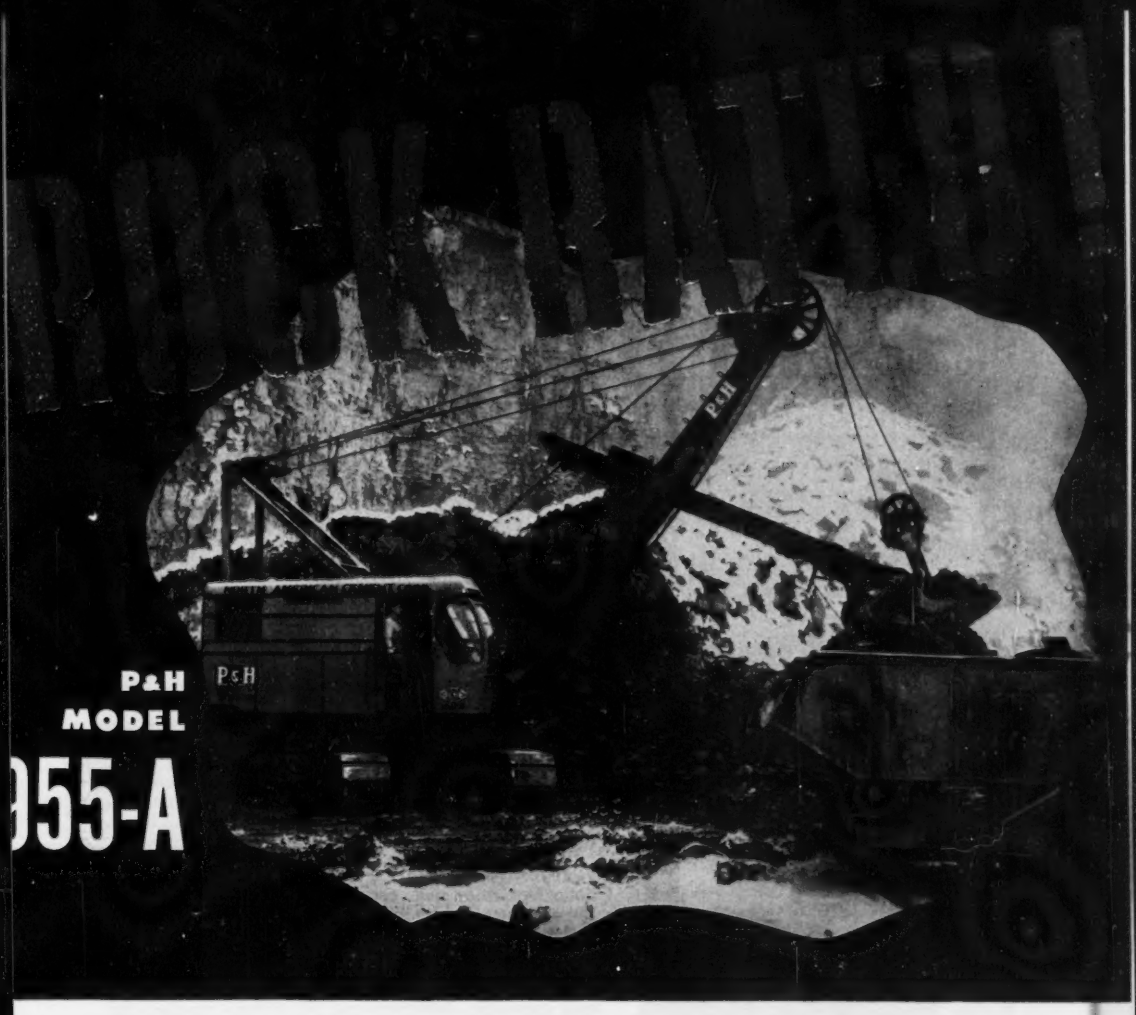
52320A

ANACONDA
COPPER MINING COMPANY

The American Brass Company
Anaconda Wire & Cable Company
International Smelting and Refining Company
Andes Copper Mining Company
Chile Copper Company
Greene Cananea Copper Company

PRODUCERS OF: Copper, Zinc, Lead, Silver, Gold, Cadmium, Vanadium, Superphosphate, Manganese Ore, Ferromanganese.

MANUFACTURERS OF: Electrical Wires and Cables, Copper, Brass, Bronze and other Copper Alloys in such forms as Sheet, Plate, Tube, Pipe, Rod, Wire, Forgings, Stampings, Extrusions, Flexible Metal Hose and Tubing.



P&H MAGNETORQUE* is the electric swing that never wears out

Just what does Magnetorque mean to you in this great 2½ yd. shovel? Simply this: It eliminates the old swing frictions with their constant headaches and replacement costs. It gives you the smoothest, slickest swing you ever saw—15% to 25% faster than any other machine of its size—and Magnetorque will last the life of your machine.

Add to this the rugged, rock-rated construction of welded high tensile steels—the smooth hydraulic control—the greater stability and digging power—and you have the greater output which means greater profit. Better get all the facts about this outstanding machine—companion to the famous P&H 1055 (3½ yds.). Ask about the P&H 955-A today.

*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.

HARNISCHFEGER
CORPORATION
4454 W. NATIONAL AVENUE • MILWAUKEE 14, WISCONSIN

R SHOVELS • CRAWLER AND TRUCK CRANES • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • DIESEL ENGINES • PRE-FAB HOMES

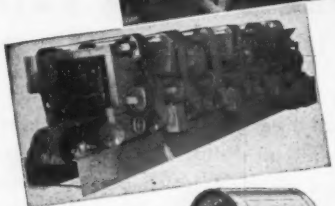
DINGS magnetic equipment for every mining requirement!

Dings Rectangular Electromagnet provides maximum iron removal above belts or chutes. Triple pole design for great magnetic strength and depth of penetration. Maximum magnetic strength across entire magnet face. Easily installed in any position. Low operating cost . . . trouble free . . . complete range of sizes.

(Right) Induced Roll Separator purifying sand.

Battery of Crockett Separators concentrating magnetite. (Left)

Magnetic Detector signals presence of tramp iron. (Right)



NEW, *powerful Cross Belt Separator — with higher selectivity—for concentration and purification (Above)*

NEW, *powerful, non-electric Alnico Perma-Pulley for purifying, cobbing, protecting crushers, pulverizers, etc. Magnetic permanence guaranteed for life of installation. (Above)*

Wherever crushers must be protected against tramp iron, wherever magnetic separation can contribute to the beneficiation of ores, you will find Dings magnetic separators specially designed to meet the requirements of the job. Dings magnetic separators have played an important role in making the extraction of many minerals possible and economically feasible. Shown here are a few of the machines which Dings has pioneered exclusively for the mining industry for the following purposes:

CONCENTRATION—everything from specially designed pulleys for cobbing nickel ores to powerful induced roll and cross belt separators for concentrating manganese, tungsten, chrome, titanium and many other minerals.

PURIFICATION—removing small amounts of feebly magnetic impurities with super high intensity separators. Minerals treated include feldspar, silica sand, salt, bauxite, barytes, nepheline-synenite, gypsum.

CRUSHER PROTECTION—magnetic pulleys, pulley type separators, drums, suspension magnets, spout magnets and magnetic detectors are all widely applied for arresting tramp iron ahead of crushing equipment.

WET TYPE SEPARATORS—Dings has pioneered in the development of wet type separators for concentrating magnetite and for use in new processes for concentrating low grade ores. *Ask for complete details of Dings Separators for Heavy Media Process Plants.*

Take advantage of Dings equipment and experience. For practical recommendations, submit your requirements with 25 lb. samples of material to the Dings Laboratory for testing and analysis. Literature on request.

DINGS MAGNETIC SEPARATOR CO.
6716 W. ELECTRIC AVENUE, MILWAUKEE 46, WISCONSIN

"Magnetic Separation Headquarters Since 1899"

Dings
"HIGH INTENSITY"

Synchronous MOTORS

To Keep Your Mills on the Job!

Grinding copper ore, this overflow type ball mill is driven by a 600-hp, 100%-pf, 200-rpm synchronous motor.

Continuous grinding is possible only if your motors are capable of continuous, trouble-free operation. Your mills can be no better than the motors that drive them.

ALLIS-CHALMERS has had more than half a century of experience building both motors *and* mills and is fully acquainted with the demands made on the driving motors. That's why it's wise to specify Allis-Chalmers synchronous motors for your mills.

ENGINEERING ASSISTANCE

The best time to start taking advantage of this engineering experience is in your early planning stages. In that way you can be assured of the power factor and torques that will fit your load and power supply requirements.

These electrical characteristics will then be built into a substantial mechanical structure engineered to serve you year after year with a minimum of maintenance. Each motor will have a sturdy fabricated steel stator yoke . . . securely held armature and field coils processed for long insulation life . . . liberally proportioned bearings . . . and many other features that contribute to uninterrupted operation.

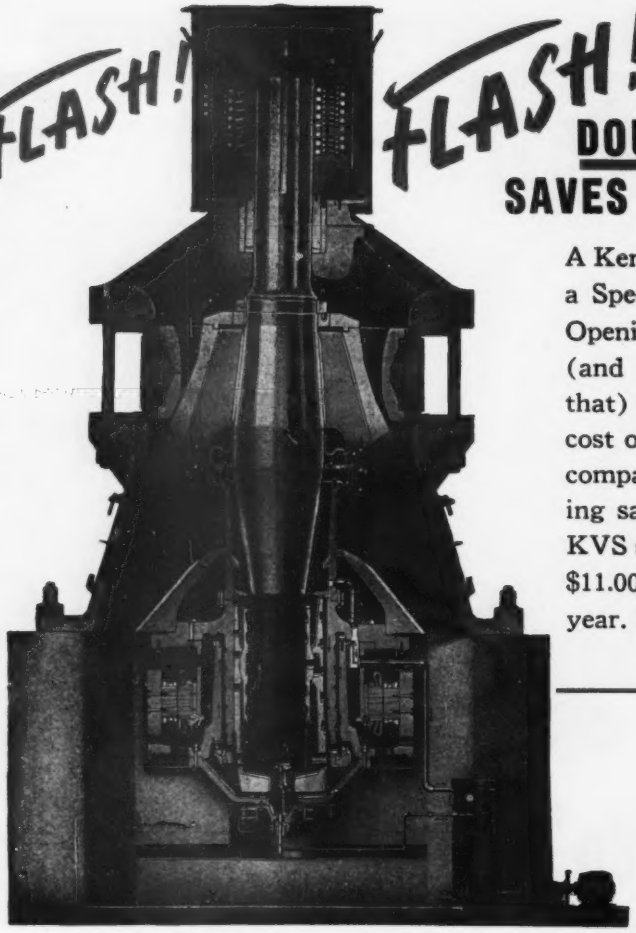
Of course you will also get the low cost and the high efficiency characteristic of synchronous motors for these low speed, grinding mill drives.

WRITE FOR BULLETIN

Construction details and ratings available in large, low speed, pedestal-bearing synchronous motors are given in our *new* illustrated bulletin, 05B7648. Ask your nearby A-C representative for a copy of this helpful bulletin, or write to Allis-Chalmers, Milwaukee 1, Wis.

A-3568

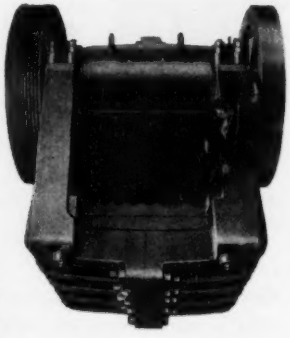
ALLIS-CHALMERS A-C ALLIS-CHALMERS



FLASH! FLASH!

KVS CRUSHER DOUBLES OUTPUT— SAVES $3,000 A YEAR!

A Kennedy No. 37½ Crusher with a Special Grinding Ring 3" Feed Opening gave 50% more product (and a finer, better product at that) for about HALF the power cost of a competitive crusher of a comparable size. With power costing say 1 cent per h.p. hour, this KVS saved some 40 h.p. (or about $11.00 daily) or around $3,000 a year. Need we say more?



FLASH!

LOAFER PUT TO WORK, PRODUCTION SOARS!

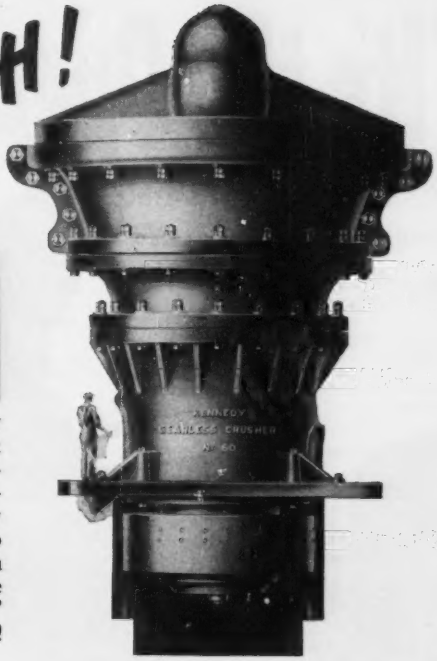
The "KVS" STATIONARY jaw never loafs because it carries 50% of the crushing load, instead of leaving it all to the SWING jaw. Production soars . . . and at the same time the Swing jaw is made stronger than ever. This jaw is ALL IN ONE PIECE, except for the crushing plate, with shaft cast integral—never can loosen! And the plate is removable and renewable. Note also — Swing and Stationary jaws are INTERCHANGEABLE, reversible end for end and side for side for DOUBLE jaw-crushing life.

SAVE CASH IN A FLASH-

KVS GEARLESS GETS FREE POWER FROM OLD IDEA!

FLASH!

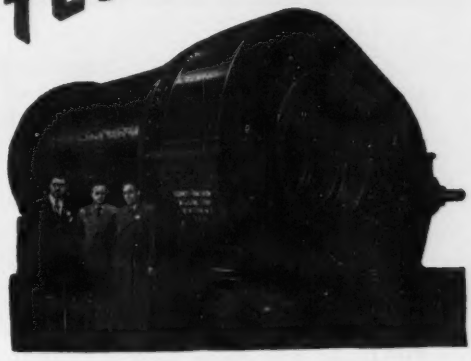
Grandpa had an idea that's good today! The big whirling flywheel or pulley of the old Corliss Engine produced extra KINETIC ENERGY! In other words, FREE power! Today the BIG Revolving Pulley in the "KVS" Roller Bearing Gearless does the same. It revolves at 3,500 ft. a minute—EXTRA crushing power without extra cost. The 11 ton pulley (in a "KVS" Gearless Crusher weighing 400,000 lbs.) turns so easy you can turn it on its roller bearings with two fingers. In few words — more CRUSHING with LESS POWER COST. Less vibration—less noise —and more important, less wear—puts the "KVS" Gearless way out in front — and keeps it there!



MILL BUYER POCKETS $5,000!

FLASH! FLASH!

This smart man was thinking of buying a 10′ diameter ball mill. He saved $5,000, maybe more, by buying a "KVS" Mill with INTEGRAL GEAR drive and using a SYNCHRONOUS MOTOR DIRECT CONNECTED to driving shaft. Pinion shaft runs about 600 r.p.m. Pinion shafts in other mills run at about 180 r.p.m. "KVS" trunnions on large sized tube and ball mills CARRIED ON OIL. Bearing never wears out, uses little power. All gears and bearings automatically oil-sprayed before mill is started (design pat'd).In 15 years on this type mill no "KVS" gears or pinions have ever worn out.



• WRITE today for complete set of "KVS" Bulletins if you want LESS cost. MORE production

Kennedy-Van Saun

MANUFACTURING AND ENGINEERING CORPORATION

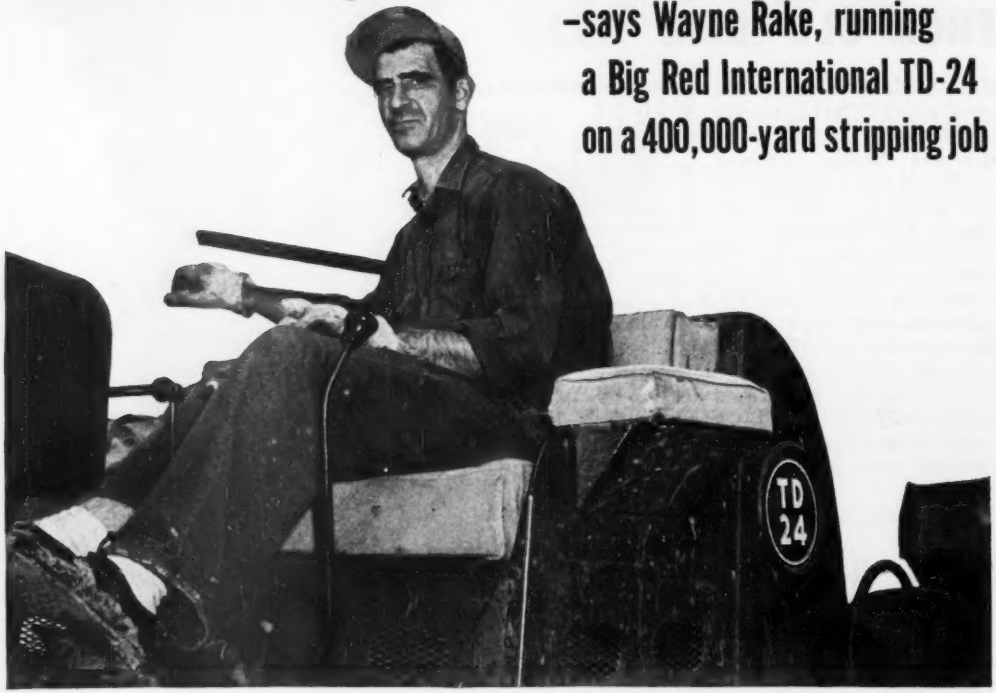
INVEST IN "KVS"

2 PARK AVE., NEW YORK 16, N. Y.

FACTORIES:
DANVILLE, PA., U. S. A.
CANADA, ENGLAND, FRANCE, ITALY, AUSTRALIA

"It's the Operator's Crawler"

–says Wayne Rake, running a Big Red International TD-24 on a 400,000-yard stripping job



Contractor Hilding Ekdahl of Fort Dodge, Iowa, is working three International TD-24s top speed at a U. S. Gypsum quarry. One hundred feet of waste and overburden covering a 20-foot vein of pure gypsum is being removed.

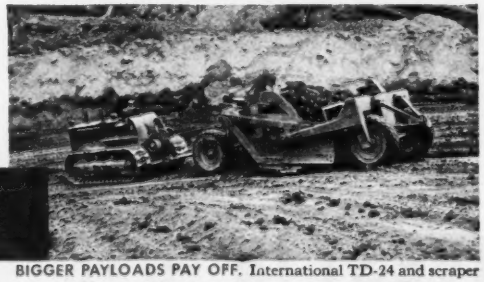
On substantial earthmoving jobs like this, operators who like their crawlers can make a big difference in the final net profit figure.

Just listen to what one of Ekdahl's operators, Wayne Rake, has to say about his TD-24:

"This TD-24 with its turns with power on both tracks, is the easiest-operating crawler for any skinner. I can load more dirt faster and make the delivery haul quicker than with any other crawler I ever operated. It's definitely an operator's crawler."

For more facts and figures on remarkable TD-24 performance that makes it the operator's pet, see your International Industrial Distributor. You'll be a TD-24 man from then on in!

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS



BIGGER PAYLOADS PAY OFF. International TD-24 and scraper strip heaping loads fast to get at pure gypsum underneath.

INTERNATIONAL HARVESTER

INTERNATIONAL

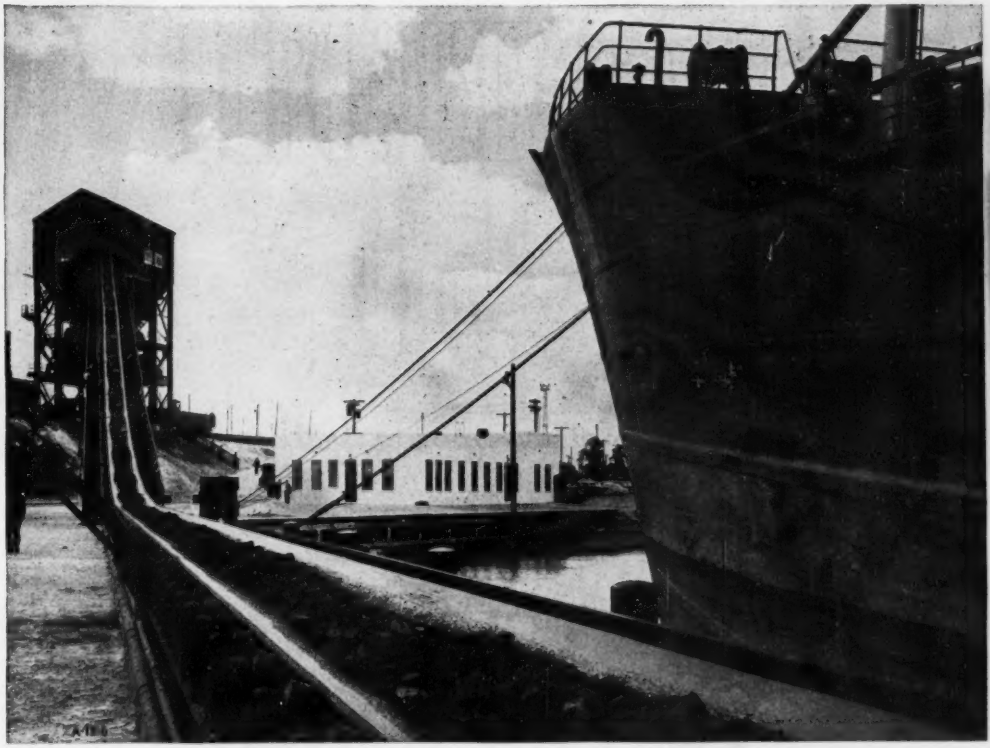
POWER THAT PAYS

S-A CONVEYING *Systems* for moving ore by the **SHIPLOAD** or **TRAINLOAD** with speed and economy

A shipload is "a lot of ore".

To move it from the ship to a string of railroad cars some 900 feet away, at a rate of 2,000 tons per hour, is no small task. However, S-A engineers are highly skilled in the art of solving these problems—from drawing board to reality. That is why industry has turned to them consistently for conveying systems designed and equipped to give efficient, low cost handling of bulk materials.

An S-A engineer represents 50 years of experience plus a complete line of equipment . . . he is well qualified to talk to you about bulk ore handling problems. Write us for full details . . . no obligation.



Belt Conveyors
Belt Trippers
Belt, Pan & Plate Feeders
"AMSCO" Steel Pan Feeders
Ship Loading Boom Conveyors
Stacking Conveyors
Storage & Reclaiming Systems
Flight & Chain Conveyors
Screw Conveyors
"Natural Frequency" Vibrating Conveyors
REDLER Conveyor-Elevators
ZIPPER Conveyor-Elevators
Conveyor Belt Cleaners
Headshaft Holdbacks
Grizzlies & Screens
Centrifugal Pliers
Bin Gates & Tunnel Gates
Car Pullers & Spotters
Hoists & Winches
Bucket Elevators
Skip Hoists

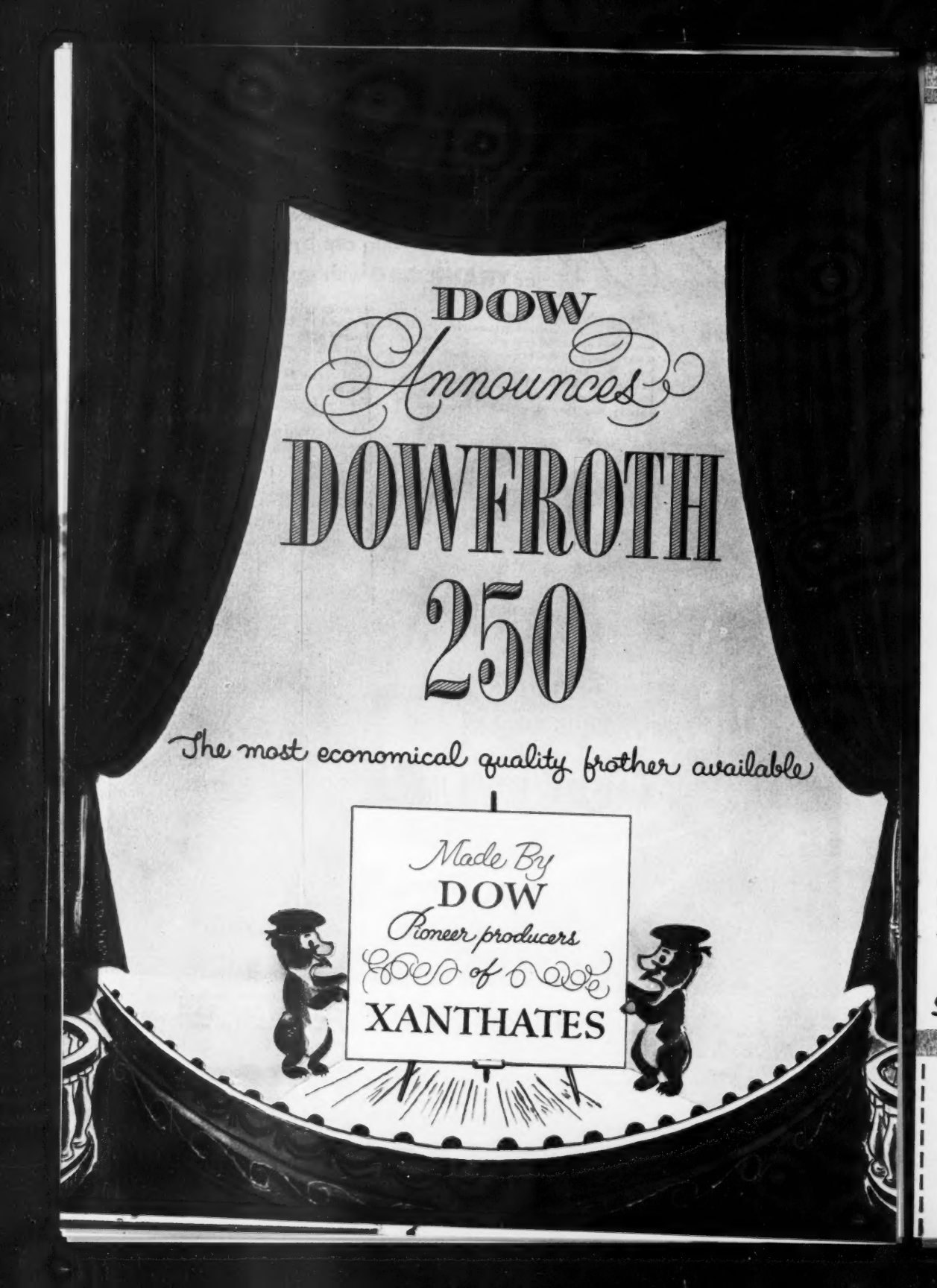
Write for a bulletin on any of the above

Baltimore and Ohio cars wait on a double track rail spur to receive a complete shipload of imported ores within 24 hours of ship arrival at the new ore docks at Curtis Bay, Maryland. The S-A installation features a four foot wide belt conveyor and several manganese steel pan feeders.

STEPHEN S-A DAMSON MFG. CO.

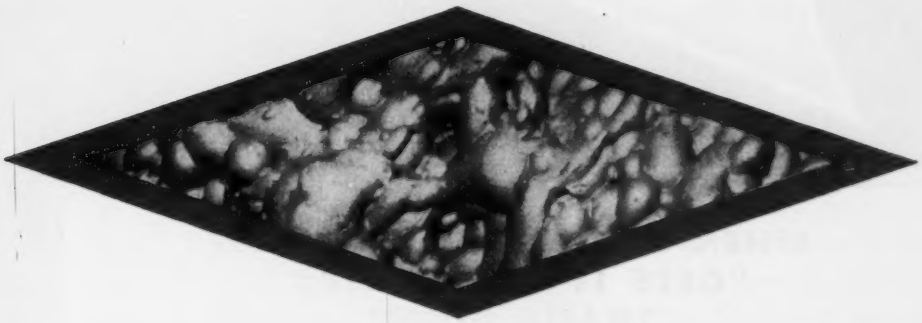
4 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif., Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT


DOW
Announces
DOWFROTH
250
The most economical quality frother available
Made By
DOW
Pioneer producers
of
XANTHATES

DOWFROTH 250

BETTER FROTHING CHARACTERISTICS
BETTER METALLURGY • WATER SOLUBLE



DOWFROTH 250 has demonstrated better frothing characteristics in actual mill tests where concentrations *as low as one-fourth of normal concentrations* have proved satisfactory. Also, it produces a livelier froth on the machine which is quicker breaking in the launders and pump boxes.

This frother offers a good possibility of improved metallurgy by raising concentrate grade and mineral recovery. DOWFROTH 250 demonstrates little or no collecting power, permitting independent regulation of frother and collector. Moreover, its water solubility permits the addition of DOWFROTH 250 as a water solution and assures return for reuse in mill water recovery systems.

DOWFROTH 250 requires practically no conditioning time and lends itself readily to stage addition. Adequate production facilities assure ready availability in both drum and tank car quantities.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

send for free Mill-Test Sample!

THE DOW CHEMICAL COMPANY, Dept. OC 45, Midland, Michigan

Name_____ Title_____

Company_____

Address_____

City_____ State_____

DOW

WHEN A DIAMOND DRILL BIT "GETS IT IN THE RIBS" THAT'S GOOD!

Nature made the selected industrial diamond the most perfect of cutting elements, yet, few of the finer diamonds are in themselves, perfect.

Almost invariably, each has a minute but fortunate distortion in structure which is caused by the presence of the vital "hard vector" or "rib," known even to the ancients as the supreme cutting edge in nature's supreme cutting instrument.

It is traditional in the diamond setter's craft that this "rib," whenever discernable, shall be set "toward the work" so that each diamond may deliver maximum cutting power.

In Truco Diamond Drill Bits, these hard ribs "toward the work" are your assurance of maximum footage at minimum cost. And, when your Truco bits "get it in the ribs," that's good, because the ribs are there to take it.

WHEEL TRUEING TOOL COMPANY
3200 W. DAVISON AVENUE, DETROIT 6, MICHIGAN

WHEEL TRUEING TOOL CO. OF CANADA, LTD.
575 LANGLOIS AVENUE, WINDSOR, ONTARIO, CANADA

Concord #20 Steam Hose

FLEXIBLE

Tough

Dependable

Illustration shows how special built-in lining of stainless steel inner wire braid assures long life under the most severe operating conditions.
Pat. applied for

BWH Concord #20 Steam Hose has a protective built-in lining of stainless steel wire braid that guards against tube swelling . . . assures dependable, long-lived service.

This rugged, braided inner lining assures maximum steam flow . . . permits easy recoupling in the field.

Other Concord #20 construction features: two or three braids of alternate high tensile steel wire and rubber layers firmly bonded over outside of tube. These provide maximum burst-protection and safety. An asbestos braid provides positive cover adhesion and acts as cover insulator. A durable, abrasion-resistant cover withstands severest abuse.

Put Concord #20 Steam Hose to work for *you — now!*

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

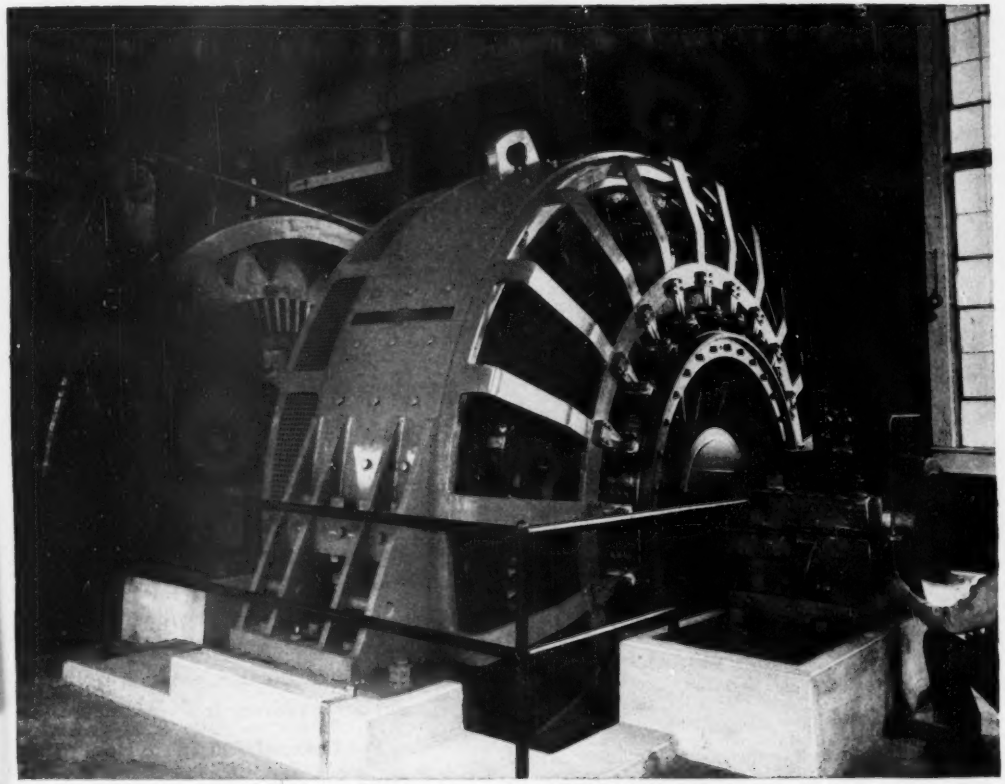
Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

BWH
DEPENDABLE RUGGEDNESS

ANACONDA installs one of world's largest hoist motors

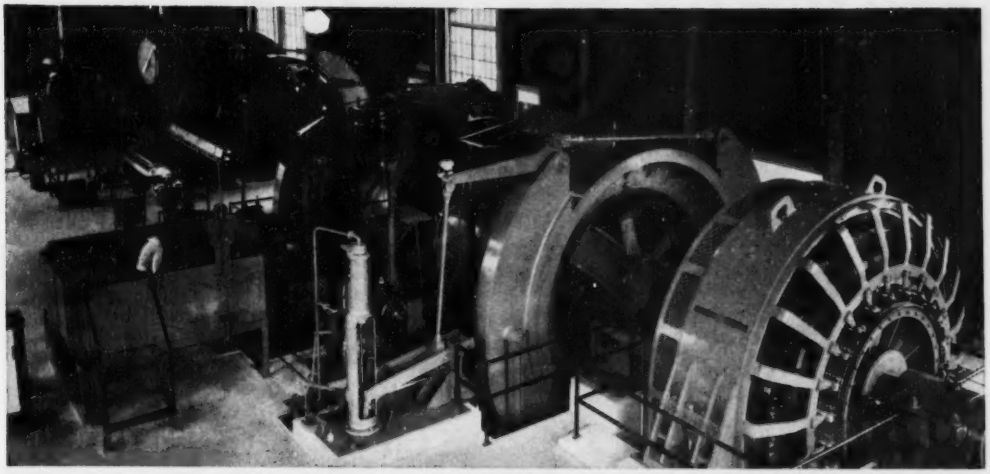
—for high-tonnage low-cost output!



Here it is installed—the G-E 3000-hp 600-volt 60-rpm d-c motor that will drive Anaconda's Kelley Shaft ore hoist. Scheduled to go into production in 1952, it will permit handling much larger tonnages than possible now. Skips, carrying 12 tons of ore per trip, will have a capacity of 853 tons per hour from 868 feet, with approximate power consumption of only 12.4 kwh per trip. From a 4335 foot depth, capacity will be 307 tons per hour, using about 57.3 kwh per trip. New hoist is expected to be able to handle approximately 10,000 tons of low-grade ore per day.

GENERAL ELECTRIC

660-21

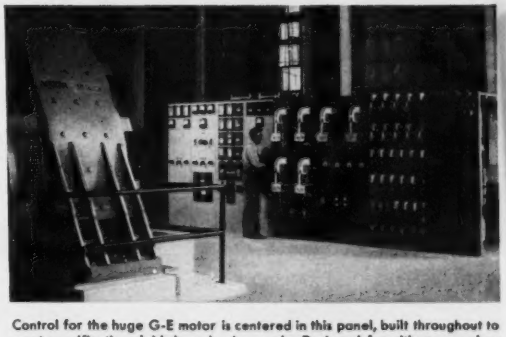


This over-all view shows the G-E 3000-hp motor direct-connected to the hoist's two drums, with the hoist operator at his control station. Expected capacity of the new hoist is 10,000 tons per day, supplemented by the 5000-tons-per-day capacity of the other hoist shown in background.

Complete G-E hoist-drive equipment for Kelley Shaft in Greater Butte Project includes 3000-hp d-c motor, permits lifting 12 tons of ore per trip at low kwh cost

High-tonnage low-cost hoisting is a "must" with Anaconda. Especially so on its Greater Butte Project for the long-range economical mining of an anticipated 130,000,000 tons of low-grade ore by block caving. That's why Anaconda, a satisfied customer since 1913, asked General Electric to supply the main ore-hoist drive in its Kelley shaft —including one of the largest single mine-hoist motors in the world!

General Electric's extensive experience covers over 900 large hoist-drive installations now serving the country's mines, helps explain why companies like Anaconda keep coming back for more of the same. When *you* call in a G-E mining-industry specialist, you put this experience to work for you —profitably. Meanwhile, send for Bulletin GET-1430, "Electric Equipment for Mine Hoists." *General Electric Company, Schenectady 5, N. Y.*



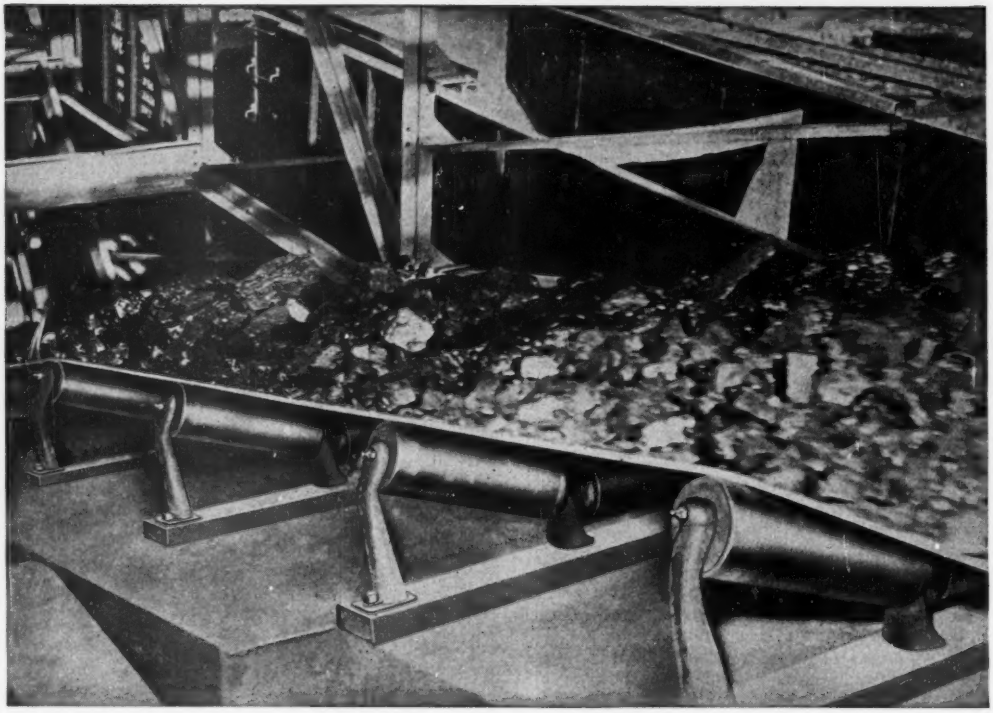
Control for the huge G-E motor is centered in this panel, built throughout to meet specifications laid down by Anaconda. Designed for either manual or automatic hoisting, the drive will operate two skips in balance, at a speed of 2250 feet—almost half a mile—per minute.

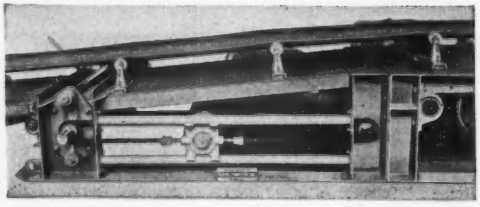
New G-E Motor Selection and Application Course can help train your mine and mill workers, increase their efficiency. A G-E "More Power to America" program, it shows how motors work, types in use, and how to select and apply them. Write now for Bulletin GEA-4938-16 describing the course in detail.

In addition to hoist motor and control panel, the G-E drive equipment includes this motor-generator set to supply the needed d-c power. It comprises a 2500-kw 600-volt d-c generator driven by a 3500-hp 514-rpm 2400-volt synchronous motor, and a 60-kw exciter.

MINE-HOIST DRIVES

ONLY ONE FIRM TAKES FULL MINE CONVEYOR PERFORMANCE



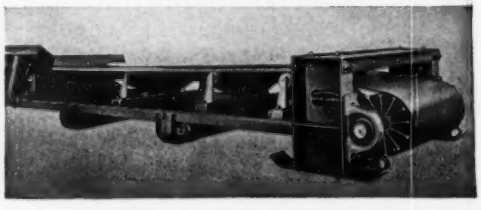


INTERNAL TAKEUP

Located directly back of the drive. Handles 10′ of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Double-acting pawl prevents backing-up. Worked from either side of conveyor.

TAIL SECTION

Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings *and belt*. Strong enough so you can rest a feeder on it.



RESPONSIBILITY FOR COMPLETE

. . . only HEWITT-ROBINS makes and guarantees both machinery and belt

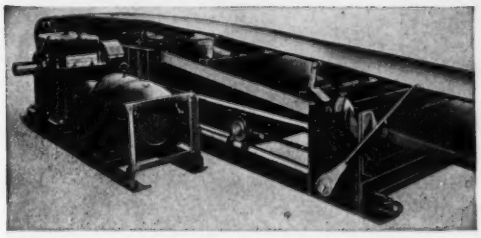
No longer need you worry about your Mine Conveyor operation—wondering who will be responsible for the successful, *lasting* performance of its machinery *and belt.*

Get your Mine Conveyor from Hewitt-Robins. Here is a company—the only company in all the world—able *and willing* to take complete *unified* responsibility for the installation. For only Hewitt-Robins makes both machinery *and belt.*

The machinery is the sturdy, strong, substantial construction made by the Robins Conveyors Division and installed in all the better mines. The belt is the long-wearing Ajax® Underground Belt—with mildew inhibitors and acid neutralizers compounded in its wear-resisting rubber covers and high tensile fabrics in its enduring carcass—made by the Hewitt Rubber Division.

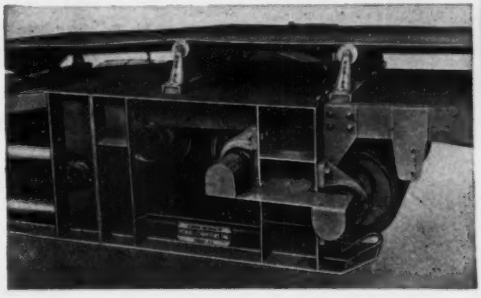
Yes, when you buy a Hewitt-Robins Mine Conveyor you get not only the best elements —machinery and belt—that your money can buy; you also get the satisfaction and peace of mind that come from having one unified source guaranteeing successful performance.

Hewitt-Robins Mine Conveyors can be shipped complete—machinery, belt, motors, reducers and drives—out of stock from Passaic, N. J., and Charleston, W. Va., in belt widths 26", 30" and 36", any desired length. For immediate delivery, get in touch with Hewitt-Robins, Inc., 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, N. J.



UNIFIED DRIVE SECTION

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.



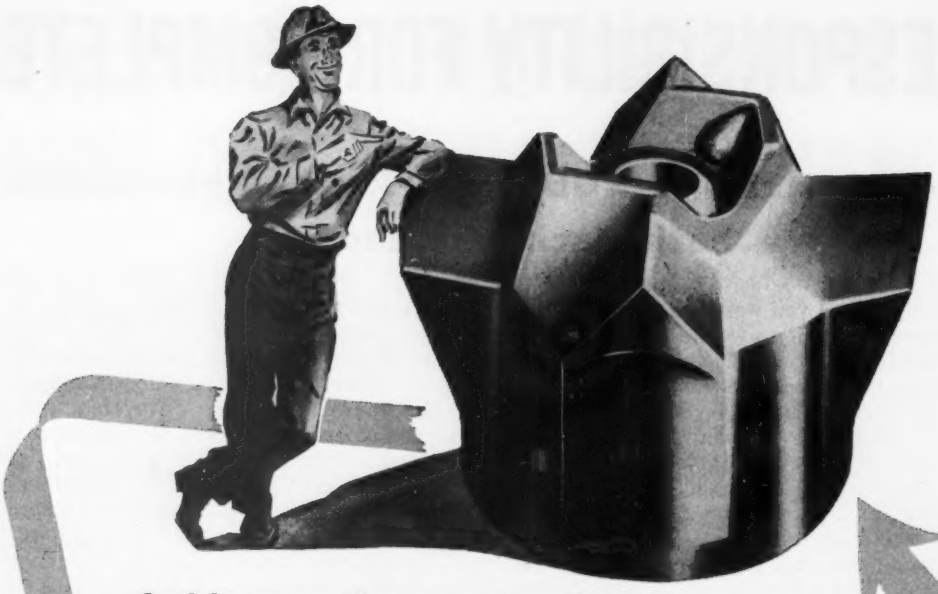
SINGLE OR TANDEM DRIVE

The genuine Hewitt-Robins Ore Mine Conveyor is the first unit of its type to successfully demonstrate its ability to handle such things as *metallic ore* for stope and main haulage. . . . For complete information contact Hewitt-Robins, 718 East Howard Street, Hibbing, Minnesota — 402 Randolph Street, Chicago 6, Illinois — 270 Passaic Avenue, Passaic, New Jersey.

HEWITT-ROBINS
MINE CONVEYORS

HEWITT-ROBINS (HR) **INCORPORATED**

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS



Liddicoat chip-action bits ELIMINATE THE DAILY GRIND

Fast drilling Liddicoat detachable bits actually chip out rock instead of grinding it until it's pulverized, as do conventional, ordinary, bits.

Liddicoat bits are engineered to eliminate the grind. Two-stage cutting action and special wing design retain sharp cutting portions for the life of the bit.

The advanced pilot section chips away the center hole to provide ease in collaring. Stopers or pluggers readily spot holes — no fighting of machine to keep correct alignment. Ample clearance between wings allows cuttings to escape easily.

Many of the world's largest mining and contracting firms know the non grinding action of Liddicoat bits increases drilling speeds and lowers costs.

Join the ever-expanding list of satisfied Liddicoat users.

"Every Little Bit Counts"

PILOT CONSTRUCTION

Section "AA", along the high-centre wings. Section "BB", along the low-centre wings.

WESTERN
Rock Bit Manufacturing Company
552 West 7th South • Salt Lake City 4, Utah

Unloading Hopper Cars

IS A FAST, ONE-MAN OPERATION

Unloading Time

Actual examples with Allis-Chalmers car shaker. Good unloading facilities.

WET SAND
1½ TO 2¼ MINUTES.

ROCK
½ TO ¾ MINUTES
. . . ½ to 6 in. crushed material.

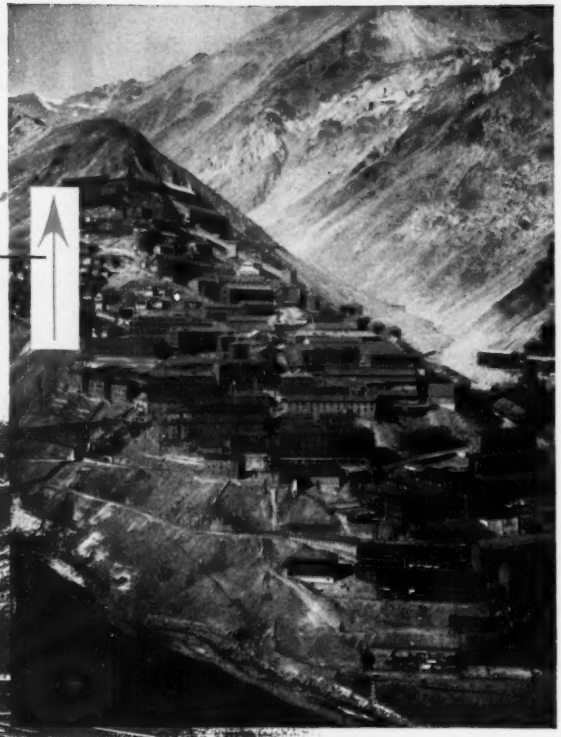
COAL
1 TO 6 MINUTES
. . . depending on surface moisture. ROM to 10 mesh x 0 screenings.

YOU CUT UNLOADING COSTS . . . Push a button and your Allis-Chalmers car shaker will empty a hopper-bottom car in *minutes* . . . and cleanly, too, even if your bulk material is damp, compacted or partially frozen. In addition, it promotes an even flow of material from the unloading station.

YOU REDUCE UNLOADING HAZARDS . . . No workman need enter a hopper car with an Allis-Chalmers car shaker. It isn't necessary, either, to re-position the shaker on the car or to adjust it manually to fit the car. Ask the A-C representative in your area to show you how this car shaker can save money in your operations. Call him, or write: Allis-Chalmers, Milwaukee 1, Wisconsin. A-3637

ALLIS-CHALMERS A-C

Mining Copper "UPSIDE-DOWN" in the ANDES MOUNTAINS



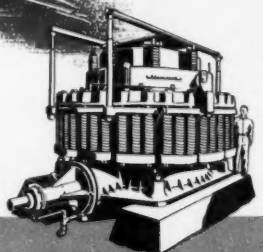
In the lofty Uspallata Pass of the famed Andes Mountains, almost 13,000 feet above sea level, stands the huge bronze *"Christ of the Andes"*, marking the boundary between Chile and Argentina.

THIS interesting view shows Sewell, the upper mining camp of El Teniente Mines of the Braden Copper Company . . . carved in the western slopes of the Chilean Andes, at an elevation of 7,000 feet.

El Teniente Mine is unique in that it is "upside down". The ore occurs high up on the mountain side and is dropped some 2,000 feet through chimneys in solid rock to an adit tunnel haulage way. Miners and supplies are hoisted, rather than lowered, to their working places.

The crushing plant at Sewell includes twelve *"SYMONS"* Cone Crushers which reduce all ore mined to less than 3/8" diameter for further treatment.

No matter where you travel in the Mining World . . . from the Andes Mountains to the Zambesi River country . . . you will find *"SYMONS"* Cone Crushers the outstanding choice among the world's leading producers of ores and industrial minerals.



"SYMONS" Cone Crushers . . . the machines that revolutionized crushing practice . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour.

NORDBERG MFG. CO., Milwaukee, Wisconsin

"SYMONS" . . . A NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

M252

"SYMONS" Primary Crushers

Grinding Mills

Mine Hoists

"SYMONS" Vibrating Bar Grizzlies and Screens

Diesel Engines

NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

NEW YORK · SAN FRANCISCO · SPOKANE · WASHINGTON · TORONTO
MEXICO, D. F. · LONDON · PARIS · JOHANNESBURG

FREE

From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.

28 PAGES
of helpful facts to know about
COTTRELL ELECTRICAL PRECIPITATORS

Packed with helpful COTTRELL Information!

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as...

- **Basic types of Cottrell Electric Precipitators.**
- **Principal parts of a Cottrell Precipitator.**
- **Mechanical and Electronic Rectifiers.**
- **Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).**
- **Removal of Collected Material.**
- **Factors in Shell Construction (steel, concrete, brick, etc.).**
- **Operating Efficiencies and the Effect of Various Factors on Performance.**

...and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

NOW SELLING

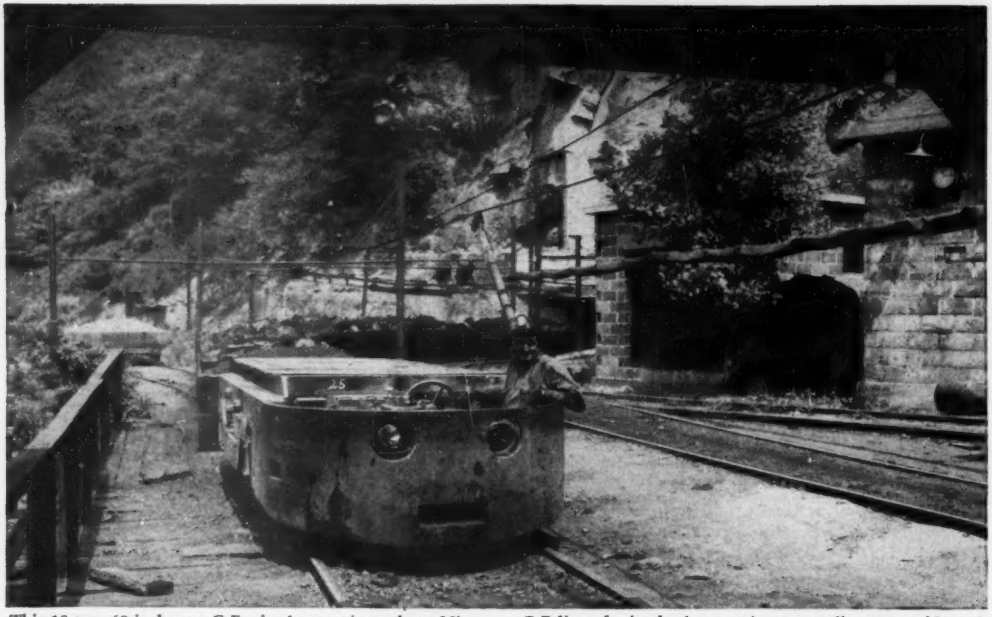
COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

...in all parts of the U.S.A. and foreign countries.

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

Main Offices: 1012 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA
CHRYSLER BLDG., NEW YORK 17 • 1 LaSALLE ST. BLDG., 1 N. LaSALLE ST., CHICAGO 2 • HOBART BUILDING, SAN FRANCISCO 4, CALIFORNIA
PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL



This 13-ton, 48-inch gage G-E mine locomotive at Ames Mining Company, Fayette, W. Va., is one model in the complete G-E line of mine haulage equipment: trolley-type, cable-reel, and storage battery locomotives; shuttle cars; and trammers.

"EASY TO HANDLE... PLENTY OF PULL"

Says Mr. Paul Morton, Superintendent, Ames Mining Co., of versatile G-E 13-ton mine locomotive

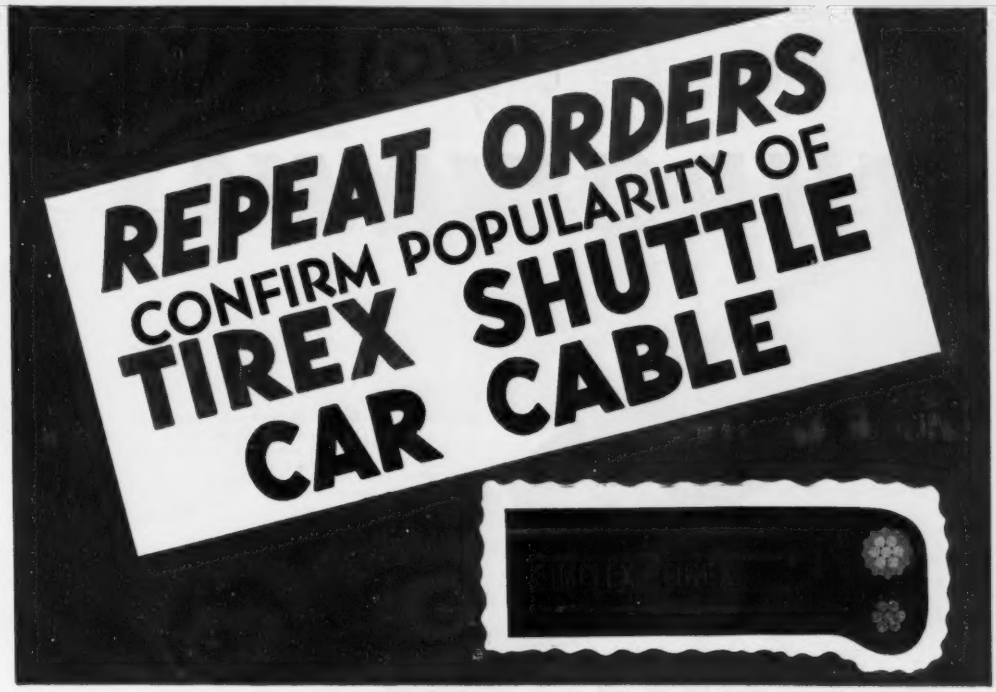
Averaging 100 tons per load, the 13-ton G-E mine locomotive operated by Ames Mining Company, Fayette, W. Va., makes as many as fifteen trips per day. Added to this schedule are such duties as shunting, spotting cars at the dumper, and returning empties for reloading. Ames personnel have declared the G-E locomotive "easy to handle with plenty of pull." Top availability, quick, easy maintenance and long periods between overhauls have backed up this peak performance with real savings.

You can count on the same efficient, money-saving performance from the General Electric mine locomotive that's right for your job. Tough, carefully engineered construction gives them staying power, cuts down maintenance expense. Smooth pickup starts big loads, and there's plenty of power for the haul. Your nearby General Electric representative can show you how the right G-E mine locomotive will bring the loads out faster and save you money. *General Electric Company, Schenectady 5, New York.*

You can put your confidence in—

GENERAL ELECTRIC

120-57



Simplex-TIREX Shuttle Car Cable with the unusual "geared" design is barely more than two years old, yet it has already achieved widespread popularity.

The reason for this unusual popularity is not difficult to find. It is told in repeat orders and in letters from enthusiastic customers. Repeat orders, of themselves, are the finest testimonial any product can receive.

The letters explain why customers are buying Simplex-TIREX Shuttle Car Cable to the exclusion of all other types for shuttle car and mining machine service. The reasons given are many and varied but they all add up to the same conclusion. TIREX Shuttle Car Cable gives longer life under more rugged conditions and will haul more tons of coal per dollar of cable cost. That's a darn good reason for anybody to buy a product.

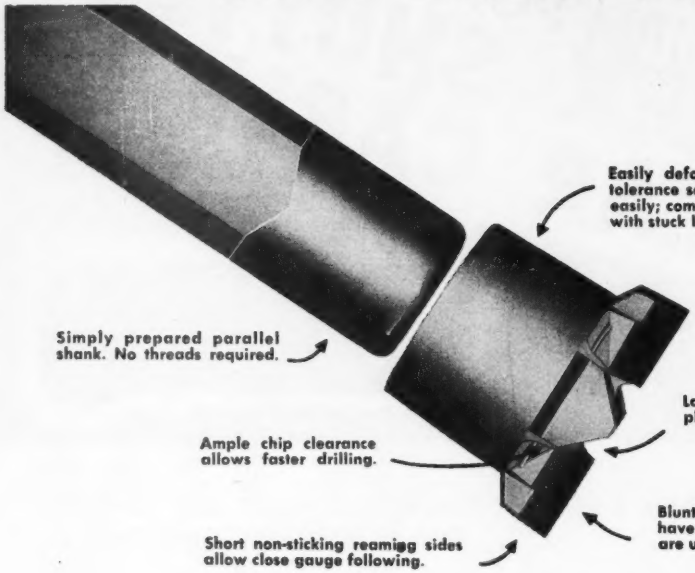
Have you tried Simplex-TIREX Shuttle Car and Mining Machine Cable yet for your "buggies"? If you haven't, you can get it from your mine supply house.

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX-TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

THROWAWAY


Easily deformable skirt with close tolerance socket hole . . . bit goes on easily; comes off easily; no lost time with stuck bits.
Simply prepared parallel shank. No threads required.
Large hemispherical non-plugging water outlet.
Ample chip clearance allows faster drilling.
Blunt non-breaking cutting edges have self-sharpening tendency — are uniformly hard.
Short non-sticking reaming sides allow close gauge following.

LOWER YOUR DRILLING COSTS
with
SMALLER HOLES AND FASTER DRILLING

Bottom with 1¼" Hole

Save Powder and Steel

DISTRIBUTORS

Bonne Terre Farming & Cattle Co.
Bonne Terre, Missouri

Creative Engineering
825 1st National Bank Bldg..
Denver, Colo.

THE "TEST" WILL PROVE ITS WORTH

THROWAWAY BIT CORPORATION

4200 N.W. Yeon Ave. Portland, Oregon, U.S.A.

Fully descriptive literature on all products is available. Competent field engineers and dealers are always at your service.

Some territories still open for distributors and jobbers.

Get maximum safety and service life at minimum cost

WITH JOY ELECTRICAL CONNECTORS

CONVENIENT • FLEXIBLE • ECONOMICAL

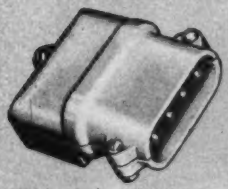
RIGHT ... Tap-off made with Joy Connector. Circuit can be opened or closed at will—speedily, safely, neatly—simply by engaging or disengaging male plug.

WRONG ... Photo taken in lead mine shows how extension was wired into main line and later carelessly cut off, thereby creating a hazardous condition.

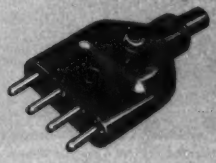
OVAL STYLES
Also available with 3 contacts

Female Portable

Female Wall Receptacle

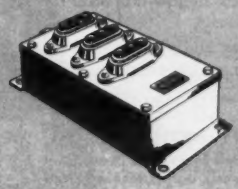


Male Machine Receptacle



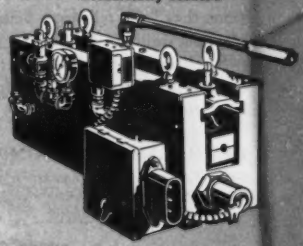
Male Portable

GANGS
#F137 Gang



For power tap-offs from single feeder to a variety of operating equipment. Available in 2, 3, and 4 outlet styles. Input fitting threaded for conduit.

CABLE JACKET VULCANIZERS
Electrically Heated



Electric immersion type heaters generate steam for heating mold. Heat control is fully automatic. Has safety "pop-off" steam valve. Available in five standard sizes.

MOLDS AVAILABLE FOR ALL STANDARD CABLE

Dangerous, makeshift wiring installations can be eliminated with the use of Joy Electrical Connectors. Of one piece molded Neoprene construction, Joy Connectors are watertight and shatter-proof—impervious to adverse climatic or mining conditions. Oils, acids, alkalies or moisture have little effect on their life span or conducting efficiency.

All Joy Connectors are supplied with lengths of cable as specified by the customer. Each Connector is permanently attached to its cable through "taper-neck" vulcanization—a process that provides additional strength at this vital point. When fully engaged, contacts are completely enclosed in a waterproof Neoprene housing.

For an easy and economical solution to your wiring problems try Joy Electrical Connectors. A wide variety of types and styles is available—each designed for maximum safety, economy, and trouble-free service.

An attractive new Joy Bulletin, No. MC-109, available upon request, describes this equipment in detail.

Write for Bulletins, or *Consult a Joy Engineer*

W&D ME 5554

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Abrasive Ores No Match for Modern Drilling Equipment

Modern rock drills, carbide-tipped bits, and Bethlehem hollow drill steel make a winning combination for drilling abrasive sulphide ores at the properties of New Park Mining Company, Keetley, Utah. Although lead and zinc are the principal ores mined on their 5000-acre property, smaller amounts of copper, silver and gold are also recovered.

In drilling hard, abrasive diorite on the 1500-ft level of the Mayflower Mine, for example, modern jumbo-mounted drifters are used to put in 6-ft holes with 1⅛-in. round Bethlehem hollow drill steel and detachable bits having tungsten-carbide inserts.

A stope on the 1020-ft level provides ore that is somewhat easier to drill. Here they use 1-in. quarter-octagon Bethlehem hollow drill steel and conventional detachable bits to put in blast holes 5 ft deep with fast-drilling stopers.

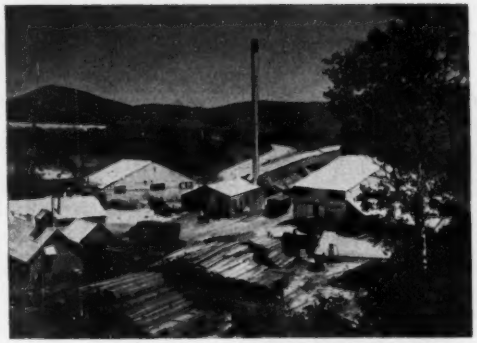
Organized in 1932, New Park Mining Company now has about 225 employees. From the beginning of their operations they have relied on Bethlehem hollow drill steel for low-cost drilling.

Stocked in all popular sections and sizes, this "old reliable" steel is available for prompt shipment from local converters or our mill depot.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★



Underground operations of New Park Mining Co., Keetley, Utah, are served by a steel reconditioning shop, compressor plant, and other facilities at the portal of the Mayflower tunnel.

Jumbo-mounted drifters, using Bethlehem drill steel and carbide-tipped bits, put in holes 6 ft deep. This fissure traverses hard diorite porphyry 3 to 8 ft wide with bands of sulphides in quartz gangue.

All aboard! The work shift starts underground at the Mayflower Mine.

Stopers on the 1020-ft level drill holes 5 ft deep, using Bethlehem hollow drill steel and conventional detachable bits. This fissure is 7 ft wide with banded lead-zinc sulphides.

BETHLEHEM HOLLOW DRILL STEEL

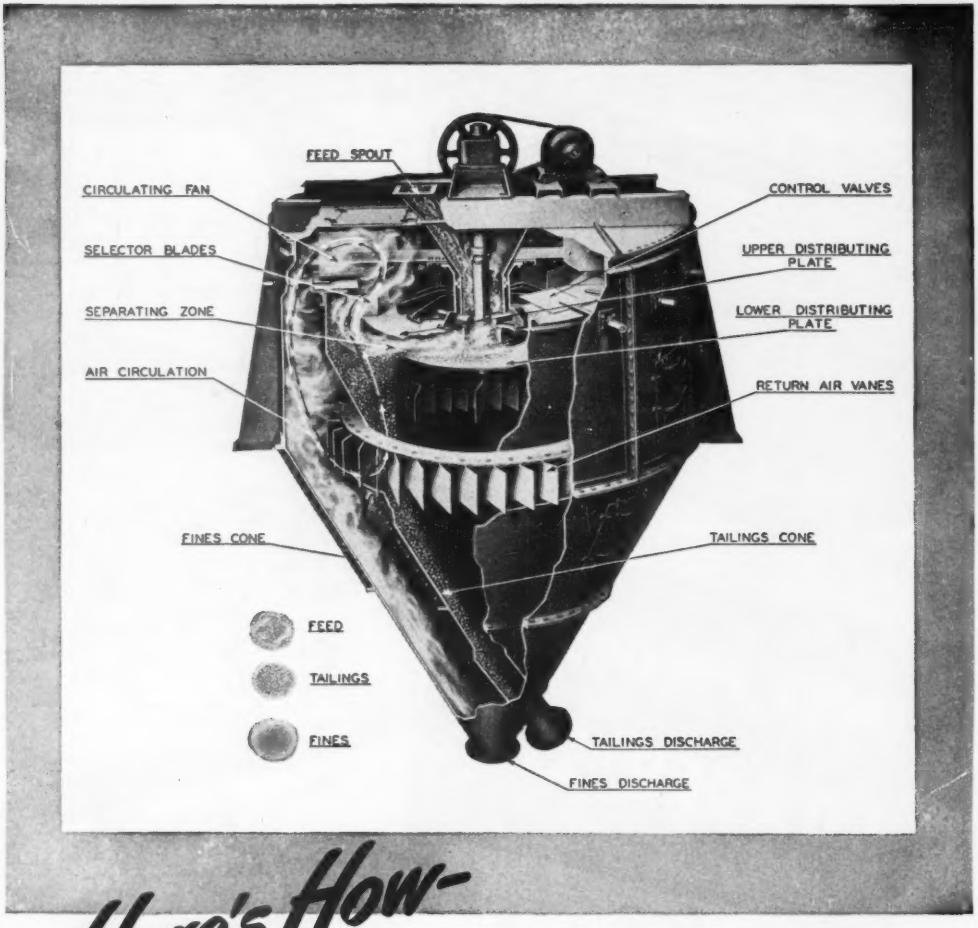
Condor HOMOFLEX HOSE

R/M engineers found a way to practically "homogenize" the wall of Homoflex Hose . . . By ingenious design, rubber tube and cover are blended together inseparably. The result, a hose wall with no pre-set twist, or stiffness. That's why Homoflex Hose is flexible as a rope, light and easy to coil and uncoil. Naturally, it lasts longer too. Made for air, water and other standard uses, Homoflex Hose has additional advantages described in Bulletin 6879D. Write for a copy • As the background suggests, Raybestos-Manhattan makes hose for every use. Your R/M Distributor will show you samples and discuss construction advantages.

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls



Here's How—

STURTEVANT AIR SEPARATORS

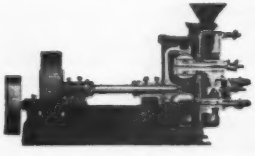
Produce accurate fines with increased output up to 300%

Exact regulation and control of centrifugal forces and air currents, one counteracting and overbalancing the other so precisely that by simple adjustments a product of almost any desired fineness is selected and collected, while coarser sizes are rejected . . . that's the principle of operation of Sturtevant Air Separators.

The benefits you derive from this separator are—increased output by as much as 25% to 300% . . . lower power costs by 10% to 50% . . . reduced maintenance.

A typical on-the-job example is as follows—a 16 ft. separator takes a feed of 750 tons per hour containing only a small percentage of the desired product and delivers 30 tons of material 90%, minus 200 mesh.

Investigate Sturtevant Air Separators today. Write for information and bulletin.



RING ROLL MILL

Capacities from 12 to 18 tons per hour. Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators.

STURTEVANT
MILL COMPANY
101-A *Clayton Street, Boston 22, Massachusetts*
Designers and Manufacturers of
CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

PROGRESS IN THE MAKING

Missouri lead mine—about 1890. The "new-fangled" steam hoist in the background was beginning to supplant the muscle-operated hoist in the foreground.

An enlargement of this photo suitable for framing is yours for the asking.

Times Have Changed...

Blasting practices of yesterday have gone the way of the hand hoist!

Once, mining mostly was a matter of "muscling" rock. Holes were drilled with hand steel. Blasted rock was hoisted to the surface with hand windlasses. Then, progress brought machine drills and fast power-hoists—and important improvements in blasting techniques.

The latest major improvement in underground blasting practices is the use of milli-second delay detonators—pioneered by Atlas in the ROCKMASTER Blasting System. Now the miner really can control the time of the application of explosives energy to blast out more ore at lower cost.

ROCKMASTER blasting offers control over breakage, throw, noise, and vibration. And improvements in this blasting *system* constantly are being made. With proper drill patterns and loadings, miners are getting results far beyond past expectations.

Find out how you can bring your blasting methods up-to-the-minute. Send for the free 20-page booklet on ROCKMASTER blasting.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

It's New!

Le Roi-CLEVELAND

S11ST Offset Telescopic Leg Stoper

It's Fast!

...and sized right

3 Sizes – 28" - 40" - 52" Feeds

It's Tough!

Built *right* by the leading manufacturer of offset and roof-bolting stopers!

S11ST Stoper lengths range from 23" closed to 86½" open.

Only Le Roi-CLEVELAND S11ST gives you all these features for dependable, low-cost drilling

★ Convenient right-hand feed control provides the right feeding pressure for fast drilling in any rock.

★ Trip rotation release allows piston to strike straight, hammer-like blows.

★ Feed leg supported at backhead and chuck housing for extra strength.

★ Fewer packings to replace in air-feed leg means less trouble, easiest servicing.

★ Button in handle provides fast, positive feed release, for quicker, easier steel changing.

★ Constant blowing around front end prevents slush and cuttings from entering drill at front end and greatly reduces wear.

★ Water tube can be removed quickly —you don't have to dismantle the machine, just take off the backhead plug.

★ Shielded safety handle protects operator's hands.

★ Air consumption is low.

Standard Le Roi-CLEVELAND S11 Offset Stopers can be converted to this new telescopic type.

So get set for faster drilling and lower costs — standardize on these new stopers. Write for complete details.

LE ROI

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION
12500 Beron Road, Cleveland 11, Ohio

Republic Rubber
CHAMPION AIR HOSE

more capable power carriers speed excavation work

You're familiar with the situation pictured above. Loose earth shoveled away while shot hole drilling proceeds. Then the blast. Then more shoveling, more drilling until the entire excavation is completed.

But do you realize that this entire operation depends upon one item?

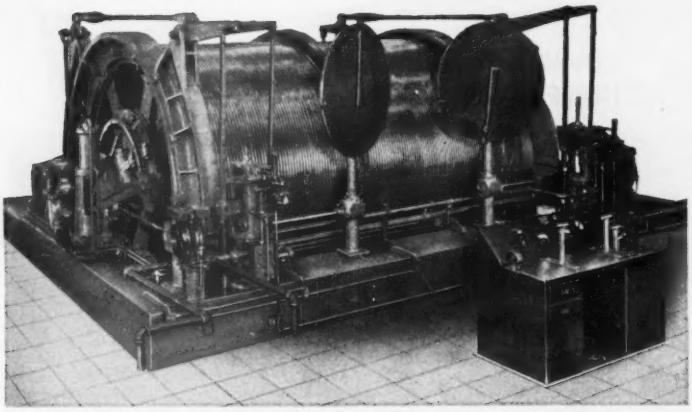
Republic Rubber Champion Air Hose delivers the power that moves the air drill that feeds the shovel. One breakdown and the whole business grinds to a halt.

On jobs like this, you profit by using the very best air hose available. That's Republic's Champion, a tough, yellow-covered work horse especially made for outdoor service. Easy to handle, easy to see, safe to use, Champion Air Hose is available through your local Republic Rubber Distributor in all standard sizes in lengths up to and including 50 feet.

Make sure your working schedule is protected through use of Republic Champion Air Hose on all jobs involving abrasion, falling rock, extreme weather conditions or workers using sharp pointed tools.

And see your Republic Distributor for a cost-saving analysis before you buy any product of industrial rubber. Remember, if it's made of rubber, Republic builds it better!!

INDUSTRIAL RUBBER PRODUCTS BY
REPUBLIC RUBBER DIVISION
Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO



Roller-Bearing Electric Hoist for metal mine, assembled in Vulcan shop. To be driven by dual 250 hp. motors (not shown in illustration) through flexible couplings and single-reduction herringbone gears running in oil. Main shaft and pinion shafts mounted in spherical-roller-bearing pillow blocks. All operating levers and instruments grouped at control desk on floor level.

Equipped with parallel-motion post-type brakes on each drum and toothed-type positive clutch on one drum. Brake and clutch engines operated by oil-hydraulic pressure. Clutch and brake on loose drum mechanically and electrically interlocked. All-steel drums are 10'-0" diam. by 6'-2" face, with machine-cut grooves for 1609 ft. of 1⅛" rope in one layer. Each drum is equipped with a gear-driven safety controller which provides complete protection for hoisting from several different levels.

For Faster, Safer, Hoisting... Rely on

VULCAN HOISTS AND SHEAVES

Vulcan Allcasteel Sheave pressed on alloy-steel shaft and mounted on self-aligning "spherical" roller-bearing pillow blocks. Besides being light and very strong, Vulcan Allcasteel sheaves are so resistant to rope wear that liners are seldom needed. Manganese steel liners are furnished, however, when required. All sizes are available with either plain or anti-friction bearings.

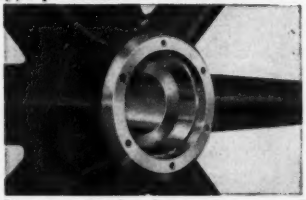
Used by leading mining companies for more than a quarter of a century, Vulcan Allcasteel Sheaves have thoroughly proved their superiority for long-time heavy-duty service. Bulletin A-396 (20 fully-illustrated pages) gives complete information.

Vulcan Electric Hoists are available in a wide range of types and sizes, from 5 to 5000 hp., to meet every requirement of the mining industry. Machine-cut steel gears and very sturdy construction throughout, assure long service life with minimum maintenance expense.

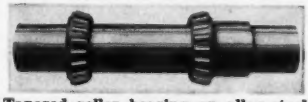
Bed plates and frames can be of either cast iron, cast steel or fabricated steel plate as preferred by the purchaser. Drums can be either cylindrical, conical or cylindro-conical; of either cast iron, cast steel, or "Built-up" all-steel construction. Modern designs and dependable safety devices promote efficient operation and permit high-speed hoisting, when required, without strain on the operator.

Heavy-duty Vulcan hoists are always designed and built especially to meet the purchaser's operating conditions. Self-Contained, Scraper-Loading, Car-Spotting and Room Hoists are available in standardized types and sizes to meet any probable requirement. Bulletin A-407 (32 fully-illustrated pages) gives complete information.

Vulcan Allcasteel Sheaves with tapered roller bearings in hubs. "Dead" shaft is mounted in all-steel clamp-type pedestals.



Close-up showing how outer race of tapered roller bearing is pressed into hub of Vulcan Allcasteel Sheave.

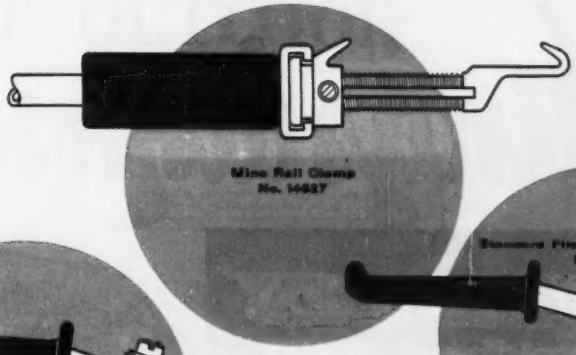


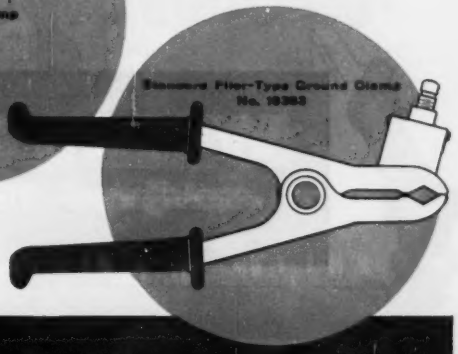
Tapered roller bearing on alloy-steel shaft of Vulcan Allcasteel sheave.

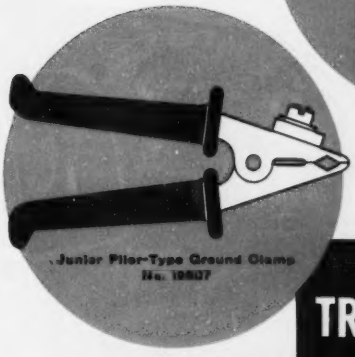
VULCAN IRON WORKS

Main Office and Works WILKES-BARRE, PA., New York Office 50 Church

Heavy-Duty Electric Hoists	Shaking-Chute Conveyors	Steam Locomotives	Load-Carrying Larries
Self-Contained Hoists	Chain Conveyors	Diesel Locomotives	Rotary Kilns, Coolers and Dryers
Scraper Hoists	Cast-Steel Sheaves and Gears	geared and electric drive	Briquetting Machines
Car-Spotting Hoists	Cages, Skips and Gunboats	Gasoline Locomotives	Heavy Special Machinery
Room Hoists	Toothed Double-Roll Crushers	geared and electric drive	Open-Hearth Steel Castings







TRY STRONG, SAFE O-B CLAMPS FOR STEADY POWER SUPPLY

Every O-B Ground Clamp gives you three important advantages: a shake-proof, dependable connection, high current-carrying capacity, and safety. See what each feature means for you:

Tight connections prevent faltering motor performance--resist jerks from the trailing cable.

Good electrical contact prevents heating; large-size jaws provide current-carrying capacity limited only by the ground wire size.

Well-protected rubber handles allow workmen to handle the clamp safely, and to make a good connection quickly.

O-B Ground Clamps are made for attachment to the rail base, rail bonds, or to negative feeder cable. One or two styles should meet every grounding need for your portable equipment. Why not put some to work?

Ohio Brass

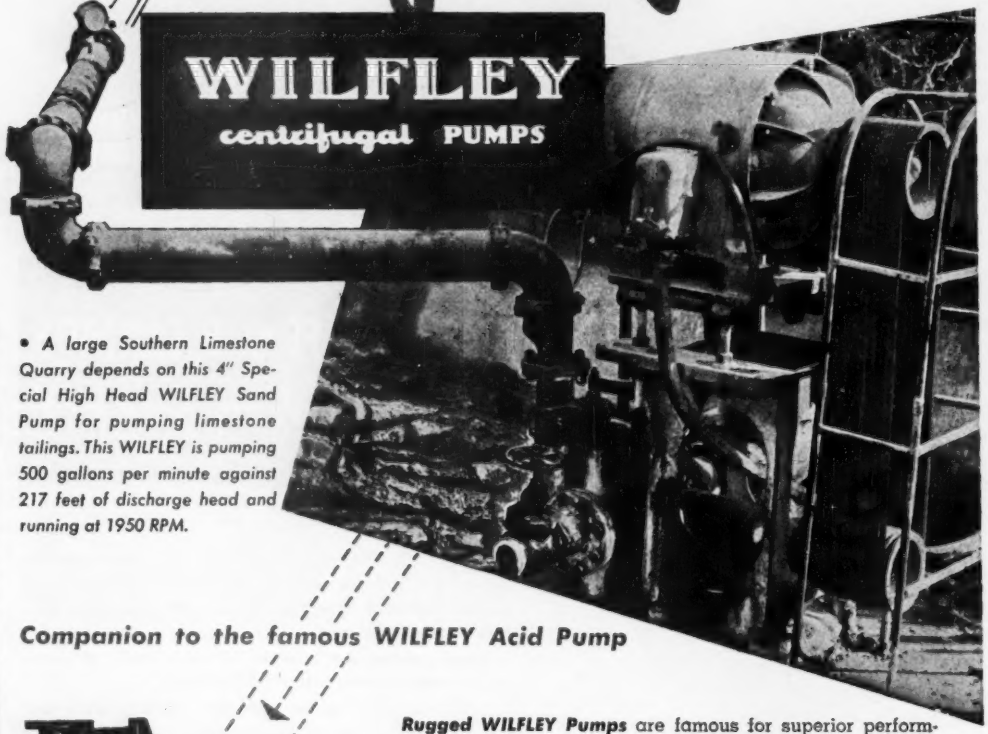
MANSFIELD • OHIO

4289-M

FOR

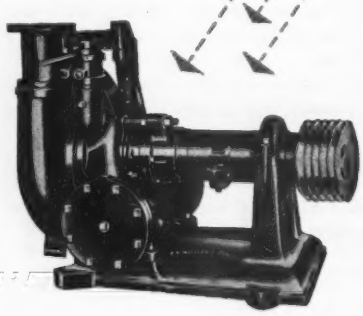
tailings disposal

WILFLEY
centrifugal PUMPS



• *A large Southern Limestone Quarry depends on this 4" Special High Head WILFLEY Sand Pump for pumping limestone tailings. This WILFLEY is pumping 500 gallons per minute against 217 feet of discharge head and running at 1950 RPM.*

Companion to the famous WILFLEY Acid Pump



Rugged WILFLEY Pumps are famous for superior performance—wherever sands, sludges, slurries, slimes or abrasive solutions of any kind must be handled efficiently and economically.

Now the new WILFLEY Model K Centrifugal Sand Pump offers important mechanical improvements—engineering refinements which save you even more dollars on the production line and in power...give stepped-up performance and low-cost operation...easy interchangeability of wear parts and low maintenance. Investigate the new Model K for trouble-free, intermittent or 'round-the-clock service on your job. Every application individually engineered. Write or wire for Bulletin 200 on the new Model K.

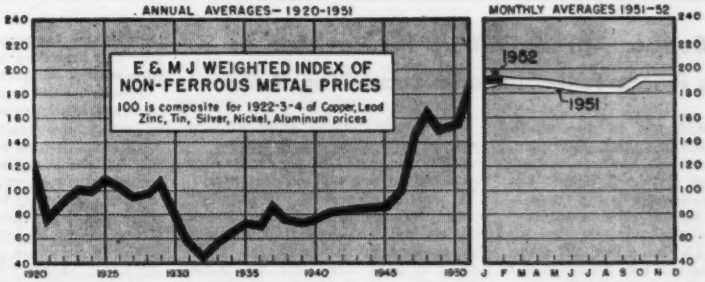
A. R. WILFLEY & SONS, INC.

DENVER, COLORADO, U.S.A. • NEW YORK OFFICE: 1775 BROADWAY, NEW YORK CITY

BUY WILFLEY FOR *Cost-Saving* PERFORMANCE

E&MJ OUTLOOK

PRICES



MARKETS

The RFC held the selling price of tin in the U.S. at $1.21½ per lb. all month. This pushed our index of nonferrous metal prices up to 195.10 for February, a new high. The previous peak was 194.06, established in February a year ago.

It looks as if the settlement basis for the first year of a three-year contract for tin between the RFC and Indonesian producers, now being negotiated, may not exceed the $1.18 basis paid for Malayan tin.

Lack of demand for premium-priced Chilean copper abroad has set Chilean officials looking for a way to maintain high income from copper. U. S. markets may be involved in this problem's solution.

•

LABOR

Mine, Mill's come-back drive in Missouri blew all four tires Feb. 19 when the CIO Gas & Coke union beat Mine, Mill in an election at St. Joe's properties. Darkens the left-wing outlook considerably.

Expect a drive for union shop contracts if Truman's Emergency Board's recommendations for a union shop for a million non-operating railroad workers is made to stick. It's the biggest labor development since Taft-Hartley.

•

AT HOME

You'll hear less and less about the copper shortage from here on. Materials for consumer goods will be in better supply, and all that's needed to push civilian production on up is a line of free-spending customers. Our feeling is that the customers are going to wait, and that production will do well to hold its own these next few months.

Mining should escape the pinch, this time, that it felt in 1949. Military demands will offset any temporary lag in civilian consumption.

Pointing up growth in western industrial stature is Kennecott's search for a spot to build a brass mill and fabricating plant out west.

Two major copper companies, other than Anaconda, have been invited by Washington to consider joining ACM in entering the aluminum business. With copper supply improving and aluminum capacity bulking ever larger, they'll certainly take time to consider the proposition carefully.

•

ABROAD

Europe's shortage of dollars, which is cutting into premiums paid for copper, may improve by mid-year. If so, they may be buying metals again, but the heat will be off the metal markets until then.

Britain is so hard-pressed for dollars, she recently sold 30,000 tons of lead at 19¢ to the U.S. for stockpiling, which she bought outside the U.S., with dollars, at about 21¢ sometime ago.

Canadian companies in the metal, oil, and coal fields are planning to spend $1,650-million in development programs in the next five years.

MARKETS—Trends and Prices

Chilean Copper Agreement Up for Revision as Premium Prices Fall—Suspend Lead-Zinc Duties

COMMODITY MARKETS on the whole were unsettled throughout February. In nonferrous metals, however, the unsettlement was restricted almost entirely to prices named in the "premium" markets outside of this country. There was no slackening in the demand here and where a few soft spots developed, they could be traced to the controls on use imposed by the government.

The supply situation in lead continued to improve and consumers were in the position for the first time in a year or more to obtain virtually all of the metal that they cared to absorb. In zinc, the supply situation differed in that galvanizers purchased the Prime Western grade freely, whereas die casters pulled back a little because of proposed cutbacks in automobile schedules. Copper was tight at all times. Purchases of tin by the government has eased the supply outlook in this metal. Quicksilver was top-heavy until a substantial quantity was taken off the market for a chlorine job. Cadmium was available in quantity.

Though premium prices in foreign markets continued to weaken, quotations for major metals in this country remained firm. Our average for tin for February was 121.500¢, which compares with 109.404¢ in the preceding month. This rise in tin caused our index of nonferrous metal prices to advance 1.27 points to 195.10, a new high for the movement.

The Federal Reserve Board's index of industrial activity for January was unchanged at 218% of the 1937-39 average. Preliminary estimates indicate that the index for February may be a little lower.

Lead-Zinc Duties Off

President Truman on Feb. 11 signed the bills passed by Congress to suspend the import duties on lead and zinc. The suspension became effective on the following day. Safeguards in the legislation provide that the rates are to be suspended until March 31, 1953, or until the end of the present emergency, whichever comes first. It also instructs the President to reimpose these duties should the price of either metal fall to 18¢ per lb. average for a calendar month. The legislation specified that the *E&MJ* quotations are to be the standard in determining the price level.

The import duty on lead before the suspension took place was 1⅛¢ per lb. on refined lead and ¾¢ per lb. on lead contained in ores and concentrates.

The import duty in effect on zinc prior to suspension was 7/10¢ per lb. for slab zinc, and 3/5¢ per lb. for zinc contained in ore and concentrates.

A move to suspend the import duty on tungsten ore by unanimous consent was blocked by Senator Langer (N. D.) on Feb. 25. The measure is expected to come before the Senate for a majority vote in the near future.

Chilean Copper Deal

Conflicting reports on developments in Chile in connection with that country's intentions on extending the agreement due to expire early in May caused widespread concern over the future of the marketing program now in force.

Chile has been encountering difficulties in marketing copper from its 20% take on the basis of $1,200 per metric ton, or a little under 54½¢ per lb. During the last two months the premium prices paid abroad have been easing and as February ended, the outside market had dropped to around 40¢ per lb. with further unsettlement likely. To maintain its flow of revenue from copper, the Chilean authorities have come up with various proposals, including a 6¢ export tax on all copper exports in lieu of the involved plan that became effective May 8, 1951. The outcome of the negotiations being carried on at the government level was unpredictable as the month ended.

Producers and consumers of copper were greatly concerned over the stability of the market should anything drastic come out of the deliberations. Those who have the long-term problems of the industry at heart fear that higher prices will only serve to bring on increased competition with other metals, chiefly aluminum. At the moment, copper producers are deeply involved with increasing production. In some instances they are beginning to worry about marketing the enlarged production that is expected to add a total of 450,000 tons to the available domestic and foreign supply by 1955.

The price situation in the major market for copper was unchanged last month, the ceiling on domestic metal continuing at 24½¢, Valley, with foreign metal at 27½¢, f.a.s. N.Y. equivalent.

Domestic fabricators obtained 130,430 tons of copper from producers during January, which compares with 119,577 tons in December. Fabricators shipped products during January that contained 131,988 tons of copper, against 106,536 tons in December. The industry attached no significance to the higher January figures because year-end inventory problems undoubtedly accounted for the wide changes.

Production of crude copper in this country in January totaled 83,208 tons, of which secondary supplied only 3,462 tons. Custom smelters are hopeful that the receipts of scrap will increase from now on.

With receipts of lead scrap up, and purchases of foreign lead by domestic consumers increasing, the entire lead situation continues to improve almost daily. The industry favors the suspension of the allocation controls on lead, and such action is thought likely before the end of the second quarter.

Intake of lead-base scrap in November totaled 65,498 tons, the highest ever reported by the Bureau of Mines. Recovery of lead from lead-base scrap in November, the latest figures available, was estimated at 43,986 tons.

Production of slab zinc in January totaled 83,205 tons, a new high. Dur-

Average Prices for February (E&MJ Quotations)

Copper:	
Electrolytic, domestic, refinery	24.200
Electrolytic, export, refinery	27.425
Lead:	
Common, New York	19.000
Common, St. Louis	18.800
Silver and Sterling Exchange:	
Silver, New York, per oz.	88.000
Silver, London, pence per oz.	77.000
Sterling Exchange, "Checks"	278.066
Zinc:	
Prime Western, East St. Louis	19.500
Tin:	
New York Straits	121.500
New York, 99% min. (e)	120.500
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	$202.000
Antimony (E&MJ) (d)	53.350
Antimony, bulk, Laredo	50.000
Antimony, in cases, Laredo	50.500
Platinum, refined, per oz.	$90.000
Cadmium (a)	255.000
Cadmium (b)	267.500
Cadmium (c)	280.000
Aluminum, 99% plus, ingot	19.000
Magnesium, ingot	24.500
Nickel (f)	56.500

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lb.
(a) Cadmium average based on the producers' quotation.
(b) Cadmium average based on the average of the producers' and platers' quotation.
(c) Cadmium average based on platers' quotation.
(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.
(e) Tin content.
(f) F.o.b. Port Colborne, U.S. duty included.

ing 1951, production averaged 77,653 tons a month.

The silver market showed no change. Business on the whole was inactive, but there was no selling pressure.

Tungsten ore in the domestic market was maintained at $65, the ceiling price. Foreign ore was available at $60, f.o.b. port of shipment.

Manganese ore consumption has been continuing at record levels, but the steel industry has been buying cautiously and less inclined to pay higher prices asked by sellers. Indian ore continued at $1.20 to $1.25 per long ton unit, c.i.f. U.S. ports.

"Free" Gold Market

Reflecting widespread unsettlement in foreign currencies, the "free gold" markets became quite active in February. Excepting Paris, most quotations on bars were slightly lower.

Quotations for "free gold," per fine oz., according to Pick's World Currency Report:

	COINS		BARS (12.5 kg.)	
	Jan. 30	Feb. 29	Jan. 30	Feb. 29
NEW YORK, transit	.....	.....	$38.75	$38.90
MANILA	$49.50	$49.50	41.75	40.75
HONG KONG	49.00	49.00	42.75	42.25
BOMBAY	55.00	54.50	49.50	48.75
TANGIER	50.50	51.25	38.85	38.90
BEYROUTH	50.50	51.50	39.00	38.90
PARIS	54.00	53.50	40.75	40.75
BUENOS AIRES	53.50	54.50	43.25	42.75

(*Markets continued on page 97*)

Major Metals

U. S. DAILY AND AVERAGE PRICES

Feb. 1952	Electrolytic Copper (a) Domestic	(b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	24.200	27.425	121.500	19.000	18.800	19.500
2	No Market	27.425	121.500	19.000	18.800	19.500
4	24.200	27.425	121.500	19.000	18.800	19.500
5	24.200	27.425	121.500	19.000	18.800	19.500
6	24.200	27.425	121.500	19.000	18.800	19.500
7	24.200	27.425	121.500	19.000	18.800	19.500
8	24.200	27.425	121.500	19.000	18.800	19.500
9	No Market	27.425	121.500	19.000	18.800	19.500
11	24.200	27.425	121.500	19.000	18.800	19.500
12	Holiday	27.425	Holiday	Holiday	Holiday	Holiday
13	24.200	27.425	121.500	19.000	18.800	19.500
14	24.200	27.425	121.500	19.000	18.800	19.500
15	24.200	27.425	121.500	19.000	18.800	19.500
16	No Market	27.425	121.500	19.000	18.800	19.500
18	24.200	27.425	121.500	19.000	18.800	19.500
19	24.200	27.425	121.500	19.000	18.800	19.500
20	24.200	27.425	121.500	19.000	18.800	19.500
21	24.200	27.425	121.500	19.000	18.800	19.500
22	Holiday	27.425	Holiday	Holiday	Holiday	Holiday
23	No Market	27.425	121.500	19.000	18.800	19.500
25	24.200	27.425	121.500	19.000	18.800	19.500
26	24.200	27.425	121.500	19.000	18.800	19.500
27	24.200	27.425	121.500	19.000	18.800	19.500
28	24.200	27.425	121.500	19.000	18.800	19.500
29	24.200	27.425	121.500	19.000	18.800	19.500
AVERAGES FOR MONTH						
Feb.	24.200	27.425	121.500	19.000	18.800	19.500
AVERAGES FOR WEEK						
Feb.						
6	24.200	27.425	121.500	19.000	18.800	19.500
13	24.200	27.425	121.500	19.000	18.800	19.500
20	24.200	27.425	121.500	19.000	18.800	19.500
27	24.200	27.425	121.500	19.000	18.800	19.500
CALENDAR WEEK AVERAGES						
Feb.						
2	24.200	27.425	121.500	19.000	18.800	19.500
9	24.200	27.425	121.500	19.000	18.800	19.500
16	24.200	27.425	121.500	19.000	18.800	19.500
23	24.200	27.425	121.500	19.000	18.800	19.500

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Feb. 1952	Sterling Exchange "Checks"	Silver (c) New York	Silver (c) London	Gold London	Gold (d) United States
1	278.125	88.000	77.000d.	248s.	$35.00
2	(e)	(e)	(e)	(e)	35.00
4	278.125	88.000	77.000d.	248s.	35.00
5	278.125	88.000	77.000d.	248s.	35.00
6	278.125	88.000	77.000d.	248s.	35.00
7	278.000	88.000	77.000d.	248s.	35.00
8	278.000	88.000	77.000d.	248s.	35.00
9	(e)	(e)	(e)	(e)	35.00
11	278.000	88.000	77.000d.	248s.	35.00
12	Holiday	Holiday	77.000d.	248s.	Holiday
13	278.000	88.000	77.000d.	248s.	35.00
14	278.000	88.000	77.000d.	248s.	35.00
15	278.000	88.000	(f)	(f)	35.00
16	(e)	(e)	(e)	(e)	35.00
18	278.000	88.000	77.000d.	248s.	35.00
19	278.000	88.000	77.000d.	248s.	35.00
20	278.000	88.000	77.000d.	248s.	35.00
21	278.125	88.000	77.000d.	248s.	35.00
22	Holiday	Holiday	77.000d.	248s.	Holiday
23	(e)	(e)	(e)	(e)	35.00
25	278.125	88.000	77.000d.	248s.	35.00
26	278.125	88.000	77.000d.	248s.	35.00
27	278.125	88.000	77.000d.	248s.	35.00
28	278.125	88.000	77.000d.	248s.	35.00
29	278.125	88.000	77.000d.	248s.	35.00
AVERAGES FOR MONTH					
Feb.	278.066	88.000	77.000d.	—	$35.00
AVERAGES FOR WEEK					
Feb.					
6	278.125	88.000	—	—	—
13	278.000	88.000	—	—	—
20	278.000	88.000	—	—	—
27	278.125	88.000	—	—	—

Calendar week averages, New York Silver: Feb. 2nd, 88.000; 9th, 88.000; 16th, 88.000; 23rd, 88.000.

(e) No market (Saturday).

(f) Closed (funeral of King George VI).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West, effective Jan. 1, 1951, commanded a premium of 1.35c. per pound over the current market for Prime Western; Special High Grade 1.50c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, as reported daily by regular suppliers, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance to such suppliers for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

E&MJ HIGHLIGHTS

Highlights in this issue:

- **Our cover takes you inside the new titanium smelter at Sorel, Quebec.** You're looking down the gallery seeing the big electric arc furnace on the left, ladles in the center, and smaller refining furnaces on the right. We're mighty proud of the talented 'scratchboard' artist who drew the cover. His name is Theodore Van Gorp (no relation to Theodore Van Gogh). He renders the drawing in india ink on a clay-surfaced paper, and then produces grays by scratching it with an assortment of tiny rakes.

- **On page 84, Mr. Whitney explains very compellingly why,** in terms of results, time, and dollars, prospectors should take an airborne look at mineral lands.

- **Canada relieved its shortage of mining manpower** in a program described by V. C. Wansbrough on page 91. He explains the "how" of the D. P. program in a way that invites similar action in the United States.

- **Nicaro nickel plant,** its reopening and a summary of the process are described on page 88. This makes the second time that the plant has produced nickel when it was most needed. Since World War II, the process has been a springboard for much research on ammonia leaching: Sherritt's nickel-cobalt process is one direct result.

The AIME convention pointed to a big future for mining:

- **Money for expansion is ready and committed.** J. K. Richardson estimated that in the next four years U. S. industry will spend $2-billion on new plants to mine and process metallic and non-metallic ores. G. C. Monture estimated that Canadian industry will spend about $1.6-billion on the mining, oil, and gas industries. Outside Canada and the United States, mining is likewise spending billions of dollars.

- **Exploration is ready to find the ore.** New techniques which point directly to where mineral is are replacing old ones that tell where it should be. Hans Lundberg and H. Maurice Tripp revealed more about scintillation surveys that outline oil-containing structures by surface radioactivity patterns. William Barret described the "Radore" system, through which an unknown extension of St. Joe's Indian Creek orebody was discovered; he also described successful tests on several known orebodies. Several men reported on the continuing success of areomagnetics. And we know geochemistry is being used increasingly, and is detecting the presence of either ore or oil. The result: Several mining companies are expanding exploration departments to get the full value of these techniques; they are assembling crews capable of combining the best new and old techniques with geologic guidance.

- **Add to these a few of production's known new aces**—the hydraulic hoist, chemical leaching techniques, the Sterling process, ion exchange—and the picture is complete.

- **Mining is ready, willing, able, and going places.**

Fables about metals:

- **An engineer we know** (he had the idea) and a janitor (he had the money, of course) barely missed becoming the richest men in the world. They planned to buy 100 pennies with each of their cheap U. S. dollar bills, export the pennies, and sell them at a huge profit on the foreign copper black market. Now we can reveal exclusively that the scheme did not fail because of an increase in the purchasing power of the U. S. dollar; it was the fall in foreign copper prices.

- **Lead:** If all government directives were set in lead-alloy type, there'd be a desperate shortage.

ENGINEERING AND MINING JOURNAL

MARCH, 1952

How Short is our Copper?

"WE HAVE NO INTENTION of going back to copper on these larger machines (200,000 kw. turbine generators), even if it should become plentiful again."

That statement is credited to Harry A. Winne, engineering vice president of General Electric Co., in a recent newspaper account of his company's success in substituting aluminum for copper. G.E.'s conservation drive last year, said Mr. Winne, had saved about 10-million lb. of copper for other defense work. This is something less than half of 1% of total U. S. copper consumption.

Coming from the world's second largest consumer of copper, this apparent determination to switch to aluminum made excited headlines in many newspapers. These, in turn, lent impetus to the U. S. government's zealous efforts to turn people to aluminum from copper.

Most of the readers of this magazine are connected, directly or through professional interest, with production of either or both of these metals. It's important to all of us, then, to have a clear look at the implications of this furor over substitution for copper. What are the facts?

1. G.E. is under strong government pressure to reduce consumption of copper; hence the announcement of the 10-million lb. saving. But remember that this 5,000 tons is only a small fraction of G.E.'s total copper consumption annually; there is no large-scale swing away from copper and there need be none. We think G.E.'s decisions on which metal to use will be based in the future, as they have in the past, on getting the required job done at the lowest possible cost.

2. But all big consumers of copper are trying right now to gage the future supply of the metal. They've been worried by recent shortages and by government talk that a copper shortage is permanently with us. The fact is that by 1955, as Anaconda pointed out recently, U. S. copper supplies could total 1,800,000 tons annually; enough to support a Federal Reserve Board index of industrial production of 270. The index currently stands at 218. The question is not one of the availability of copper, but of the need for re-examination in Washington of copper allocation generally. In the opinion of close industry observers, there has never at any time been a real copper shortage.

3. There is no doubt whatever that aluminum usage would be undergoing tremendous expansion today, even if there had been no military demand at all to reckon with. Statistically it can be shown (See *E&MJ*, Aug. 1951, p. 60) that aluminum is a "young" metal still well over on the rapid growth side of its consumption curve. Copper, on the other hand, is a "mature" metal, well along on a plateau of use that holds only moderate growth possibilities. But it would be naive to suppose that there should be any major substitution of one metal for the other unless and until it becomes economically logical to do so.

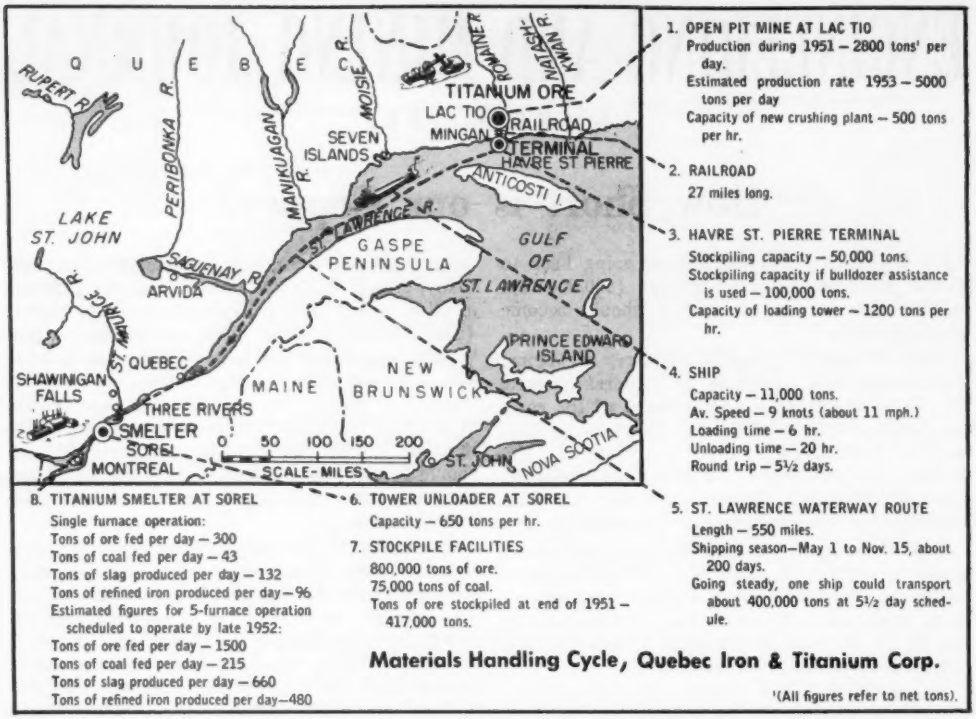
4. Supplies of metals to civilian consumers are about at their lowest ebb. Barring all-out war, more metal should be available to consumers from now on. Just as the feeling of shortage spread swiftly, so the feeling of plenty can snowball among consumers. We have seen it happen again and again. Sometime this year, perhaps as early as the third quarter, the copper shortage could easily evaporate. Those who have made a hasty switch to an uneconomic use of another metal are likely to regret it.

In the face of evidence as plain as this, why does the government persist in predicting an endless copper shortage, and why does it go to such lengths to achieve a substitution for copper?

There are these possibilities: One is that Washington is convinced that war is inevitable and that civilian consumption of copper must be cut to the bone and beyond, in order to conserve the metal for eventual all-out military production. Another is that having contracted to build up aluminum smelting capacity to a rate that seems likely to outrun any possible civilian demand, Washington simply has to find something to do with the impending surplus of aluminum plant capacity.

This growing power, and the obvious willingness, of Washington to pitchfork commodity distribution into and out of normal channels at will, is going to add to the burden of all factors in the metal industries—not copper alone. Yet we have enough faith in the collective common sense of our nation to feel that in the end the correct decisions will be made, if we all help make them. The future looms clearly as one of growing industrial dependence on a widening range of metals and minerals. Building that future will call for the best effort each of us has to give.

How Q.I.T. balances its huge materials-handling cycle.



1. OPEN PIT MINE AT LAC TIO
Production during 1951 – 2800 tons' per day.
Estimated production rate 1953 – 5000 tons per day
Capacity of new crushing plant – 500 tons per hr.

2. RAILROAD
27 miles long.

3. HAVRE ST. PIERRE TERMINAL
Stockpiling capacity – 50,000 tons.
Stockpiling capacity if bulldozer assistance is used – 100,000 tons.
Capacity of loading tower – 1200 tons per hr.

4. SHIP
Capacity – 11,000 tons.
Av. Speed – 9 knots (about 11 mph.)
Loading time – 6 hr.
Unloading time – 20 hr.
Round trip – 5½ days.

5. ST. LAWRENCE WATERWAY ROUTE
Length – 550 miles.
Shipping season—May 1 to Nov. 15, about 200 days.
Going steady, one ship could transport about 400,000 tons at 5½ day schedule.

6. TOWER UNLOADER AT SOREL
Capacity – 650 tons per hr.

7. STOCKPILE FACILITIES
800,000 tons of ore.
75,000 tons of coal.
Tons of ore stockpiled at end of 1951 – 417,000 tons.

8. TITANIUM SMELTER AT SOREL
Single furnace operation:
Tons of ore fed per day – 300
Tons of coal fed per day – 43
Tons of slag produced per day – 132
Tons of refined iron produced per day – 96
Estimated figures for 5-furnace operation scheduled to operate by late 1952:
Tons of ore fed per day – 1500
Tons of coal fed per day – 215
Tons of slag produced per day – 660
Tons of refined iron produced per day – 480

Materials Handling Cycle, Quebec Iron & Titanium Corp.

(All figures refer to net tons).

QUEBEC IRON AND TITANIUM CORP.'S mining, smelting, and materials-handling cycles have been set in motion. Titanium-rich slag and refined iron are now being delivered to consumers in Canada and U.S.A.

World's Major Titanium Mine & Smelter Swing into Full-Scale Production

ALVIN W. KNOERR
Associate Editor

NOW THAT THE INDUSTRIAL WORLD has been alerted to the growing importance of titanium metal and its oxides to peacetime and defense economies, it is only natural that much interest should be focused on the progress of two operations covered in this article—(1) The world's largest ilmenite deposit totaling over 100-million tons at Allard Lake, Quebec, and (2) the first large-scale titanium smelter to produce a rich titanium slag and refined iron at Sorel, Quebec,—both operations conducted by Quebec Iron & Titanium Corp. owned jointly by Kennecott Copper Corp., and New Jersey Zinc Co. This enterprise stands solidly upon two legs of accomplishment—the discovery and development of the orebody by Kennecott, and the evolution through research of an economic smelting process by New Jersey Zinc Co.

Progress has been unbelievably rapid. It was only five years ago that exploration engineers hauled out the first sled-load of high-grade bulk samples for shipment by plane to metallurgical test laboratories from the newly discovered Main orebody near Allard Lake. And today, ore is being mined at the rate of 2,800 tons per day, hauled over a recently constructed 27-mi. railroad running on regular schedules; shipped 550 mi. up the St. Lawrence River to Sorel, where it is processed at the smelter to produce a marketable titanium-rich slag and refined iron. The quality of both smelter products measures up to the expectations of the metallurgists who pioneered the process and supervised the installation.

About 5,600 gross tons of iron and 5,200 gross tons of steel were produced for the Canadian market and 7,200 gross tons of slag shipped to the U.S. pigment producers for bulk testing in their plants. By the end of 1951, some 473,000 tons of ore were delivered from mine to smelter stockpiles.

In short then, Q.I.T.'s initial production cycle from mine to market has been set in motion. Principal future expansion will be in the smelter where additional furnaces are being installed and techniques constantly improved.

Following the ore—from mine to Havre St. Pierre terminal.

BULLDOZERS strip shallow overburden on 100-million-ton Main orebody. See text for explanation of tail cable.[1]

WAGON DRILLS work on upper bench of pit. Two 25-ft. benches shown here expose faces of virtually solid ilmenite.

DOMINION 1½-yd. power shovel loads 22-ton Euclid diesel truck on upper bench of the Main orebody.

SHOVEL loads 60-ton ore car from lower bench. In future ore will first go through new crushing plant at mine.

1,000-HP. DIESEL-ELECTRIC locomotive is ready to haul 14-car train over 27-mi. trip to terminal.

AT HAVRE ST. PIERRE ore is crushed, stockpiled, and later transferred by belt in foreground to ships.

The Mine at Lac Tio

Conventional open-pit mining methods are used at the Lac Tio orebody, involving the use of wagon drills, power shovels, trucks operating on a series of 25-ft. wide benches established at 25-ft. vertical intervals. During the first stages of operation, trucks dumped ore over a bench adjacent to the railroad track, from where it was reloaded by shovel into ore cars. Since the ore had to pass through 30-in. hopper openings in the bottoms of the cars, the ore had to be blasted quite fine, and considerable secondary blasting was necessary. But this procedure has been only temporary because a new crushing plant is now under construction at the mine. This will eliminate double handling of the ore because the trucks will dump directly into receiving bins

at the crusher. Also fine blasting and extensive secondary blasting will be unnecessary because the new jaw crusher will handle chunks up to 4 ft. And finally, a new Quarrymaster drill, capable of putting down 6-in. blast holes with tungsten-carbide bits is expected to simplify drilling problems appreciably after it is installed.

Stripping methods at Lac Tio are unique in some respects. Overburden is only 2 to 3 ft. thick on an average, consisting of boulders, clay, and gravel resting upon a smooth but rolling, eroded knobby surface of solid ilmenite. To prevent dilution of this high-grade ore, mining crews do a meticulous job of cleaning off the waste. First bulldozers scrape off the larger masses of waste. To prevent bulldozers from sliding off the steep surfaces of some of the bald ilmenite exposures, it is sometimes necessary to tie a tail cable to an operating bulldozer (see illustration) which is paid out and hauled in on the winch of a stationary tractor in such a way as to maintain constant tension and yet allow the operating bulldozer to scrape safely to, and just over, the brow of a roll. Overburden which is lodged in crevices or small pockets is then removed by horse-drawn scrapers or hand shoveling.

In many ways, the Lac Tio orebody is an open-pit miner's dream. The sheer solid ilmenite is more of a concentrate in place than an ore. Only a few horses of waste are in evidence. Contacts are sharp, changing abruptly from white anorthosite to jet-black ilmenite. Thus there are no assay walls to worry about. Grade of ore can be determined within an accuracy of 0.2% by a simply specific gravity test involving the immersion principle. This eliminates much assaying to check grade. Pit operators try to maintain a shipping grade of about 88 to 90% which refers to the combined percentage of iron and titanium oxides. A 90% ore would run about 35% TiO_2 and 40% Fe.

The Railroad

Among other jobs at Havre St. Pierre is the operating of a full-fledged, standard-gage railroad; this includes maintaining a 27-mi. track and roadbed through 12 mi. of low swampy ground, 15 mi. of rocky rough terrain, through a 700-ft. tunnel and over two fast rivers. Engineers operating the locomotives are retired operators from Canadian railroads, and bring with them all the skill and experience of veterans together with a lot of youthful pride in their jobs which is obvious when you watch one of them bring in the 5:30 train on schedule.

Two-Way Radio

Recently a test run was made with two-way Marconi radio telephone equipment installed in the cab of a locomotive in communication with a sending set at the mine. Signals came through satisfactorily along virtually all of the 27-mi. run, including the 700-ft. stretch inside the rock tunnel. This radio is expected to be useful in dispatching and communications problems.

New Power Line

The other vital link between mine and terminal is an overhead 33,000-v. power line now nearing completion along the railroad right-of-way. To date all power at the mine has been diesel generated. However, with completion of the new 500-ton-per-hour crushing plant at the mine, it will be possible to supply electric power from the central power station at the terminal.

Q.I.T. generates all of its own power at the Havre St. Pierre terminal. All power is produced in a central power plant housing two 375-kva, 575-v., 60-cycle, 3-phase, diesel electric units. This supplies power to the boiler house, ore-loading equipment, crushing plant, shops, offices, and other buildings and residences in the terminal. A third 375-kva unit, generating 2,300-v. power will soon be installed, principally to supply power to the mine through a 33,000-v. step-up transformer.

Thus all power at the mine, terminal, and railroad is ultimately dependent upon a diesel fuel supply, and ample provision has been made to keep this supply available. Oil arrives in tankers and is pumped from the dock through an 8-in. pipe line to three centrally located storage tanks, two holding 10,000 bbl., and a third, 5,000 bbl. Diesel fuel is shipped to the mine in a standard railroad tank car. In addition to taking care of Q.I.T.'s needs, the central power plant supplies power to the village of Havre St. Pierre which adjoins the mine property. A trip to the village reveals something new in the shop windows—toasters, heaters, and other electrical appliances which the villagers had not had prior to the arrival of Q.I.T.

Remote location of Havre St. Pierre required special attention to two other problems: warehousing and equipment maintenance. Since there is no distributor's supply house or repair shop within ready access by rail or road, warehouse facilities have to be adequate to guarantee uninterrupted operation of the mine, railroad, and terminal; and repair facilities have to be ample to prevent shutdowns. Weeks may be lost if a vital equipment unit breaks down and important parts have to be brought in by plane or ship. Spacious warehouse areas adjacent to the railroad are now nearing completion. Stocks may run ½ to ¾ million dollars.

For repairs and maintenance, a new mechanical shop 165 x 64 ft. with a 20-ton overhead crane is nearing completion. The central aisle contains a track to receive locomotives and other equipment. On either side of this aisle are repair bays of varying width, each specifically designed to handle a certain type of equipment.

Shipping Cycle

Shipping ore over the 550-mi. St. Lawrence River route from Havre St. Pierre to Sorel is another important link in Q.I.T.'s huge materials handling project. As of September 1951, the 11,000-ton Liberty-type ship Mont Alta, owned by Montreal Shipping Co., made the round trip in about 5½ days including 6 hours to load the ship and 20 hours to unload.

To maintain a cycle like this the ship's master, Captain Rousseau, his officers, pilots and crew have had to keep going steadily, frequently relying on radar, the ship's gyro-compass, radio beacons, and land lights and signals to navigate through the narrow and sometimes shallow channels which may clear the bottom by only a few feet in spots. Ebb tides and currents, unless carefully avoided, can combine to produce a current so swift that a ship making 10½ knots upstream will actually stand still with respect to land. Nevertheless, Captain Rousseau and his crew have demonstrated that this part of the transportation cycle can be handled reliably.

Since the normal shipping season on the St. Lawrence is from about May 1 to November 15, stockpiling operations at Sorel must be handled much the same as by the steel industry on the Great Lakes.

(*Continued on page 76*)

Facts in brief about the Quebec Iron and Titanium Project

I. Timetable of Progress

1941. J. A. Retty, of Quebec Geological Survey, reported occurrence of ilmenite in Allard Lake area.
1942. Claims staked out by various parties.
1943. Kennco Explorations, Ltd., Canadian subsidiary of Kennecott Copper Co., formed.
1944. Kennco undertakes reconnaissance in area. Some claim options taken up.
1945-46. Kennco performs methodical survey over area adjacent to Allard Lake. Lac Tio orebody discovered.
1947. New Jersey Zinc Co. applies for patent related to production of titanium-rich slag by new smelting process. (Patent granted July, 1949.)
1947. Airborne magnetometer surveys confirm extent of titanium deposits in the area. Diamond drilling reveals over 100-million tons of ore at Lac Tio deposits.
1948. Quebec Iron & Titanium Corp. formed by New Jersey Zinc Co. and Kennecott Copper Co. to operate mine and process ores. Railroad construction started. (October)
1949. Smelter and dock construction started at Sorel.
1950. Mining starts at the Grader orebody. Railroad completed.
1951. Mining starts at the Main orebody. Smelter starts operations with ore smelting furnace completed and four under construction. Iron and steel in ingot form shipped to steel mills. First slag shipment made to U.S. companies for experimental use. Ore shipped to Sorel totaled 473,000 tons by the end of the year.
1952. Mine production scheduled to be about 3,000 tons per day. Five furnaces to be completed by end of year to treat about 1,500 tons of ilmenite per day.
Future. Smelter can be enlarged, and plant can be expanded as economic conditions permit.

II. What It Cost To Get the Project Started
(Up to Jan. 1, 1952)

Exploration		$ 500,000
Mine Development		2,200,000
Mine Property		400,000
Mine Construction		1,700,000
Havre St. Pierre Terminal		3,200,000
Railway		7,700,000
Smelter	16,400,000	
Experimental Oper.	2,200,000	18,600,000
Total to Jan. 1, 1952		$34,300,000

III. Ore Deposits in the Allard Lake Area

1. Main orebody. Now being mined by open-pit methods. Contains more than 100-million tons of proved ore, averaging 36% Fe and 32% TiO_2. Size, 3,600 x 3,400-ft. covering 134 acres. Exact depth not determined in some places—some 300-ft. diamond-drill holes bottomed in ore.

2. Cliff orebody. Adjacent to Lac Tio. Contains 12-million tons averaging 32% TiO_2 and 36% Fe. Size, 1,240 x 740 ft. Average thickness is 200 ft.

3. Grader orebody. About 3 mi. south of Main orebody. Approximately 200,000 tons removed during 1950 and 1951. Average grade was 35% TiO_2, 40% Fe. Now idle. Some ore still remains in bottom and sides of pit.

IV. Geology in Brief[1]

1. Geologic History. Precambrian metamorphosed sediments in the area have been intruded by a huge anorthosite mass exposed in an oval shaped area about 60 mi. long. Ilmenite orebodies, derived from the parent magma, occur within the anorthosite as lense-shaped orebodies or dikes. Area is cut by strong faults easily recognizable from aerial photographs.

2. Ore minerals. Ilmenite, dense, black, coarsely crystalline; plus microscopic exsolved crystals of hematite constituting about 15% of the ore and accounting for the high iron content of the ore. (Pure ilmenite normally contains about 31.6% Ti, 36.8% Fe, and 31.6% O, according to *Mineralogy* by Kraus and Hunt.)

3. Gangue minerals. Pyrite, feldspar, pyroxene, biotite, pyrrhotite, and chalcopyrite.

4. Typical analysis of ore from diamond drill holes:

	TiO_2	Fe	S	P_2O_5	Cu	V	Mn	Ni	Co
%	34.8	38.8	0.36	0.010	0.12	0.22	0.08	0.03	0.014

V. What It Takes to Run the Mine at Lac Tio

Three 500-cfm portable air compressors.
Seven I-R wagon drills with DA35 drills.
Steel in use: 1½ in., hollow round.
Bits: 2-in. tungsten carbide.
Six 22-ton Euclid trucks.
Two Dominion 1½-yd. power shovels.
One Marion 3½-yd. diesel-electric power shovel.
Four Koehring Dumptors.
Two Caterpillar D8 tractors.
Explosives used: 60% Forcite powder, 1x8-in. for blockholing, and 1½x8-in. for drill holes. Short-period delays ranging from 0 to 8 over period of 1/25,000 to 1/75,000 sec.
Mining method. Open-pit with benches 25 ft. high and 25 ft. wide. Drill Holes spaced 3x4 ft.
Future plans call for use of Quarrymaster drill putting down 6-in. drill holes with tungsten-carbide bits, using a spacing of 12 ft. x 15 ft.

VI. Facts About QIT's Railroad

Cost: $7.7-million.
Length: 27 mi. including a 700-ft., 23 x 18-ft. rock tunnel; 15 mi. through rocky country, 12 mi. through muskeg and swamp, 880 ft. of steel bridges across the Romaine River; and 166 ft. of steel bridges across the Puyjalon River.
Equipment: Three 1,000-hp. diesel locomotives. One 45-60 ton diesel-electric Brownhoist crane. Forty ore cars, capacity 60 tons. One passenger coach. Two oil tank cars. Four flat cars.
Operating schedule: During Sept., 1951, schedule was as follows:

Three trains per day hauling fourteen 60-ton cars	2,520 tons
One train per day hauling	280 tons
Total	2,800 tons

Future: Present installation is more than adequate for the 3,000 ton per day production rate scheduled for 1952.

VII. Ore Loading Facilities at Havre St. Pierre

At present trains haul ore to 250-ton-per-hour crushing plant from which −2-in. material is hauled to trestle and stockpiled. This temporary crusher will be replaced by new 500-ton-per-hr. plant at mine.

Storage. Trestle 33 ft. high, 574 ft. long capable of handling a 20-car ore train. Live storage area beneath trestle will hold 25,000 tons. If bulldozers are used, this capacity can be more than doubled.

Ore from storage pile goes through 37 draw gates feeding 42-in. conveyor belt in underground gallery. Belt speed is 450 fpm, powered by 125-hp. motor.

First belt transfers onto second 42-in. belt. Second belt is continuous traveling to end of boom section on top of loading tower. This belt is powered by 150-hp. and 50-hp. motors in two-pulley tandem drive. Belt speed is 500 fpm.

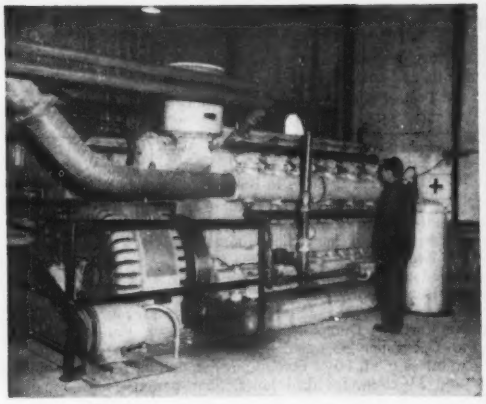
Present loading speed is about 2,000 long tons per hr.

VIII. List of Facilities at Havre St. Pierre

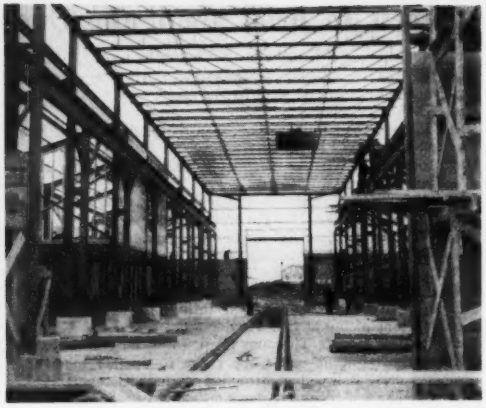
1. Power plant. Major units contained—three 375-kva diesel electric generators.
2. Warehouse buildings, spacious, structural steel with metal siding, concrete foundations.
3. Repair shop, structural steel and concrete block construction.
4. Fuel storage tanks. Two 10,000-barrel capacity; one 5,000-barrel capacity.
5. Offices.
6. Nine company-built residences.
7. Staff house.
8. Boarding house and dining hall.

[1] Information taken largely from "Geology of Allard Lake Ilmenite Deposits" by Paul Hammond. CIMME Transactions LII, 1949.

Q.I.T's Havre St. Pierre terminal—a modern installation.



ISOLATED HAVRE ST. PIERRE is dependent entirely upon electric power generated by company diesel plant.



NEW MECHANICAL shop at the terminal with 20-ton overhead crane will service all major operating equipment.

25,000-BBL. of diesel fuel can be stored in these[2] tanks. Note also company shops, offices, houses.

LOADING TOWER at terminal handles 2,000 tons per hour. Note passenger car recently unloaded for railroad.

Sorel

The first thing visitors notice on arrival at Sorel is the 375-ft. towers carrying high-voltage lines across the St. Lawrence—an impressive reminder that titanium smelting is a power-consuming industry. (Shawinigan Water and Power Co. has contracted to supply some 160,000 hp. to the Sorel operations.) As in the aluminum industry, it appears that titanium ores will move toward sources of ample power, rather than power to the mines. Sorel is ideally located for other reasons as well: (1) Labor supply is adequate because of industries which operated here during World War II. (2) Dock facilities are ample for ocean-going ships which means that titanium slag could be shipped to Atlantic ports and elsewhere. (3) Rail facilities are available to bring in coal and supplies and haul out the iron and slag to the Hamilton-Montreal area and to the U.S. (4) The St. Lawrence provides the only logical means of transport from the mine to smelter.

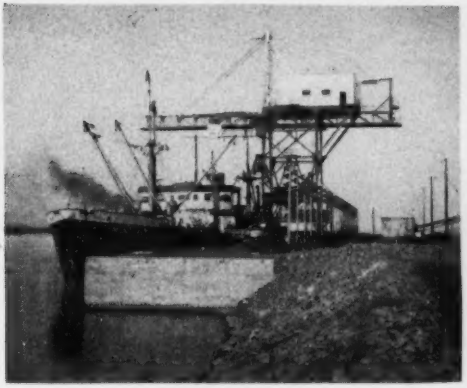
Ore is removed from the ship at the 500-ft. long concrete wharf by a 10-ton clamshell bucket operated from a traveling tower unloader at a rate of about 650 tons per hour. ore then goes through a hopper onto a cross-conveyer belt paralleling the crane track. This conveyor discharges onto a long and unusually versatile conveyor system flanking the stockpile area. A traveling tripper casts off the ore at any desired point from where it is transferred to the top of the stockpile by crane-operated clamshells. This same stockpiling belt receives coal from a car shake-out station and distributes it to a stockpile abutting the ore stockpile.

As shown in the accompanying flowsheet the ore and coal go through dryers, and crusher, to hoppers which feed the smelting furnace. Capacity of each furnace is 300 tons of ore per day. This is blended with about 43 tons of coal and fed on a continuous basis. This is one of the distinctive features of the New Jersey Zinc Co.'s process which makes it possible to produce such a high-grade slag. See table, page 79. Even the ash content of the coal (anthracite) must be low to keep impurities out of the slag.

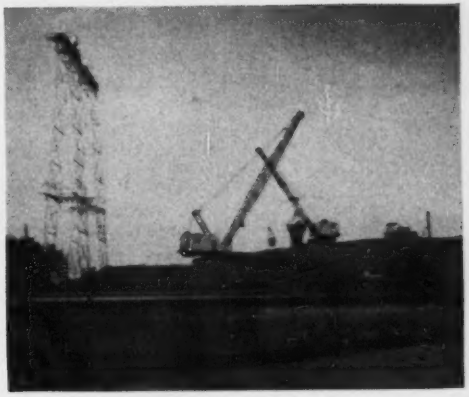
The furnaces are box-shaped, steel - framed refractory - lined units containing six graphite electrodes in line—two for each phase of the three-phase, 224 to 390-v.

PHOTO CREDITS. [1] Photo by Geo. Hunter, courtesy Caterpillar Tractor Co. [2] Photo by Geo. Hunter, courtesy Canadian Metal Mining Association.

At Sorel the ore moves from ship to titanium smelter.

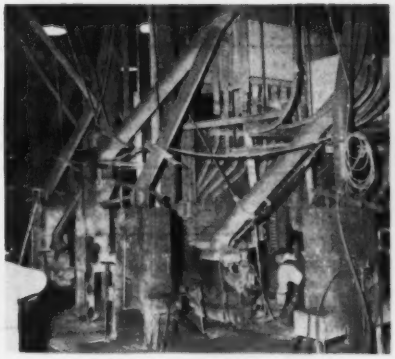


TRAVELING UNLOADER at Sorel removes 650 tons of ore per hour from holds of 10,000-ton Mount Alta.



CLAMSHELLS, traveling tripper, and bulldozers distribute ore to Sorel stockpile. Tower supports power line to plant.

CAR SHAKEOUT unloads coal cars. Reclaimed ore and coal are also fed from this point by belt to storage bins in the smelter.



FEED BOXES on smelting furnace show how carefully titanium smelting must be controlled.

power supplied through Amplidyne controls which constantly adjust the elevation of the graphite electrodes to maintain proper temperatures and arc voltage. Smelting is done at about 3,000 deg. F.

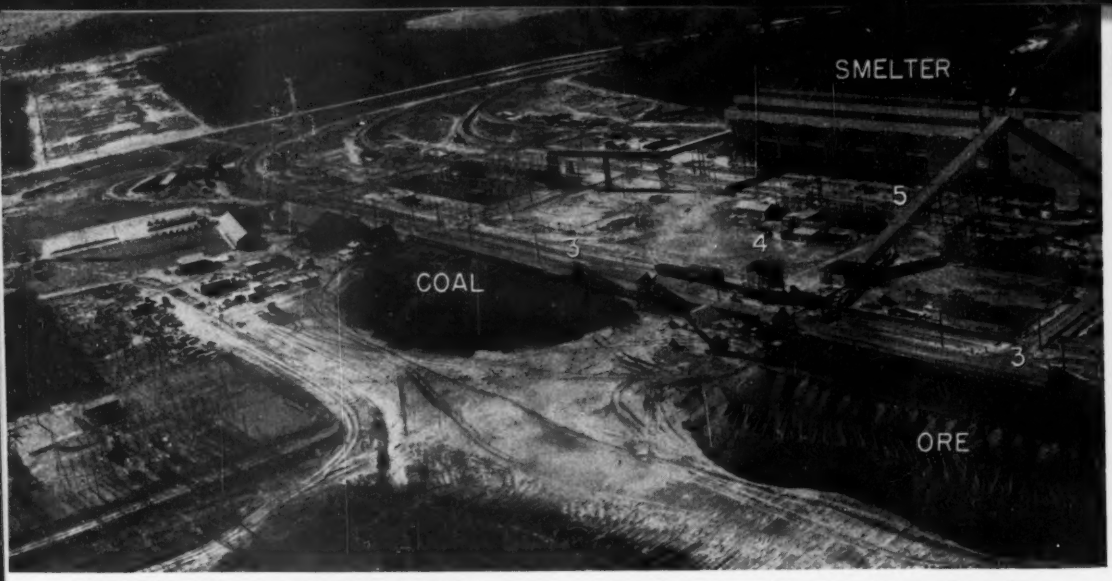
At this temperature the titanium slag has a voracious appetite for almost any kind of a refractory. Hence the feed must be introduced into the furnace in such a way that it will keep the hot slag away from the furnace lining. This accounts for the multiplicity of hoppers and down-spouts that one sees on top of the furnace which feed just the right amount of material, to just the right part of the furnace, and at just the right rate. Since the feeding is continuous, and the tapping of slag and iron intermittent, one can readily appreciate that this is a delicate problem.

Careful study of the table on page 79 will show you that the smelting operation is a reducing one in which most of the iron in the ilmenite and associated hematite is extracted as molten metal, and remaining ingredients go into the slag. The furnace atmosphere is maintained at a slight positive pressure and contains about 80% CO. This prevents contamination by air, but also means that the furnace must be adequately sealed. Surplus CO, produced at the rate of about 2,000 cfm per furnace will be scrubbed and put to useful purposes of heating the plant and ore dryers.

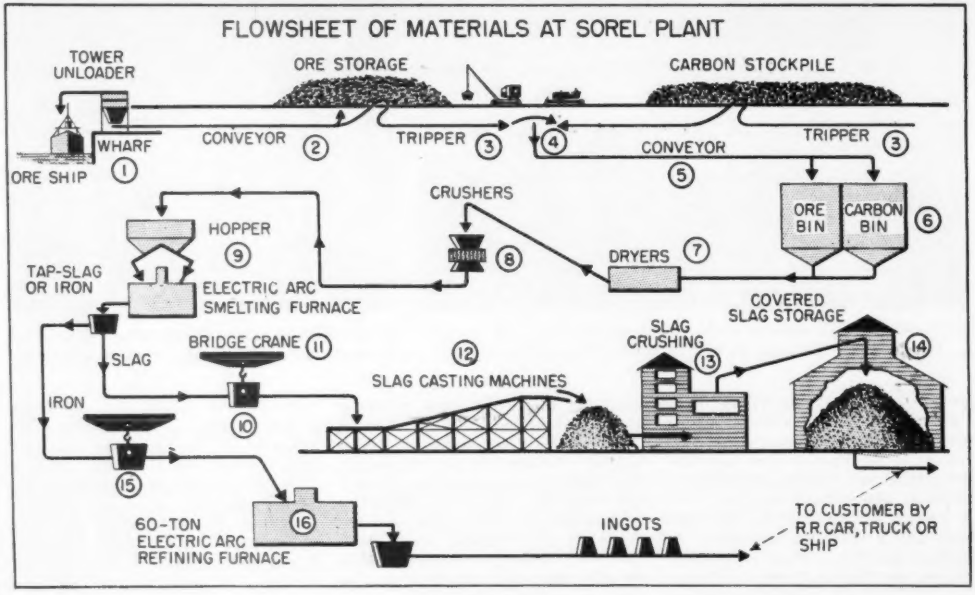
Titanium slag is tapped off periodically into a cast-steel slag pot and transferred by crane to a tilting mechanism. The tilting mechanism slowly dumps the pot with a controlled flow to a modified pig casting machine. The slag is water quenched on the casting machine and drops to a surge pile. It is then crushed and stored for shipment.

Molten iron is also tapped periodically (12 hr. cycle per furnace) and transferred from the smelter (via 60-ton ladle and crane) to the 60-ton electric arc-type refining furnaces. These furnaces are also equipped with Amplidyne controls. Since no lime flux is used in the smelting process the iron contains a considerable amount of sulphur, and the refining process is principally a sulphur removing problem. Desulphurization is accomplished by introducing lime and other fluxes into the molten bath under nitrogen gas pressure which flow through an expendable steel lance. The nitrogen acts as a flux carrier and produces sufficient agitation to give intimate mix between metal and slag. The new nitrogen-lance technique used by Q.I.T. decreases reaction time, and

(Concluded on page 79)



TITANIUM-RICH SLAG AND REFINED IRON are produced from ilmenite at this Sorel smelter. Numbers refer



LEGEND

1. Tower unloader (Wellman), 1,000 tons per hr. free digging.
2. Stockpile conveyor (Link-Belt), 36-in., 1,000 tons per hr.
3. Traveling tripper (Link-Belt), 1,000 tons per hr.
4. Car shakeout (Hewitt-Robins); track hopper; and transfer conveyor, 150 tons per hr.
5. Conveyor to ore bins (Link-Belt), 36-in. 500 fpm, 1,000 tons ore per hr., 300 tons coal per hr.
6. Four wet ore bins, total capacity 1,560 tons. Two dry ore bins, total capacity 870 tons.
7. Rotary ore dryer (Hardinge), 7 ft. 6 in. x 70 ft., 100 tons per hr. Rotary coal dryer (Hardinge), 7 ft. 6 in. x 70 ft., 30 tons per hr.
8. Two (Symons) short-head crushers, 100 tons per hr. each.
9. Smelting furnace, 300 tons of ore per 24 hr.
10. Slag pot, 35 tons.
11. Two bridge cranes (Dominion Bridge), dc. Main hoist, 75 tons. Auxiliary hoist, 25 tons.
12. Slag casting machine (Bailey, Pittsburgh), approx. 100 tons per hr.
13. Slag crusher (Taylor), 36 x 48-in. 200 tons per hr.
14. Covered slag storage bin (future) 20,000 tons.
15. Iron ladle, 60 tons.
16. Two refining furnaces (Volta), 60 tons.

to flowsheet and legend below. Table at right shows what smelter accomplishes. *Photo courtesy Shawinigan Water & Power Co.*

gives better control of the process. See table page 78 for amount of sulphur removed from the iron by this process. The two refining furnaces now installed will be sufficient to handle the iron product coming from the five smelting furnaces scheduled for operation by late 1952.

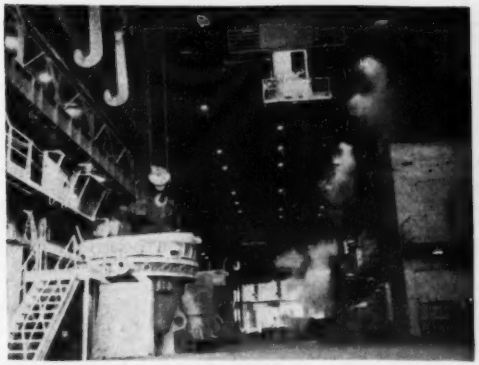
Refined iron is presently cast into 23 x 25 x 80-in. ingots weighing about 10,000 lbs. By the end of 1952 the iron will be cast over a pig casting machine producing 80 to 100 lb. pigs.

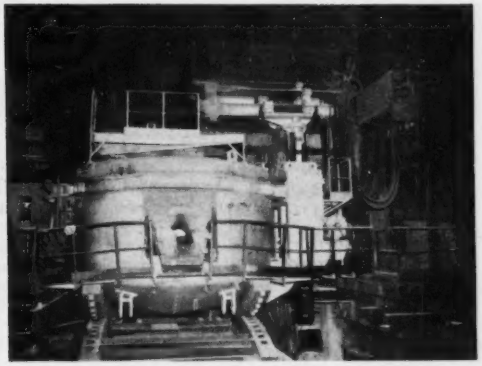
E&MJ thanks Frank J. Walling, General Manager of the Quebec Iron and Titanium Corp., and his associates at Montreal, Sorel, and Havre St. Pierre for their generous assistance in the preparation of the information presented on this page and elsewhere in this article; also the Kennecott Copper Corp., and New Jersey Zinc Co., joint owners of the Q.I.T. project.

TABLE A—Typical Analyses of Ore and Products Showing What the Smelting Process Accomplishes

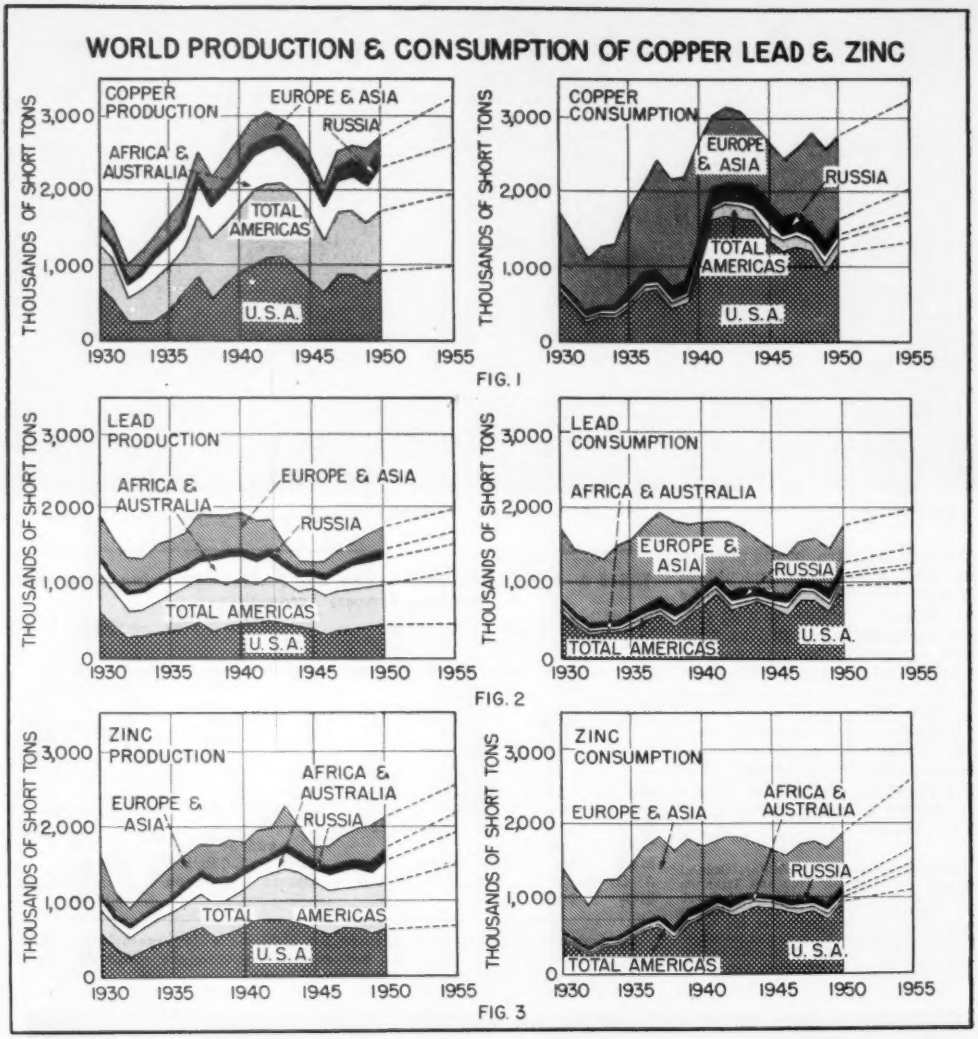
Ore	%	+ Flux[1]	→ Slag	%	+ Crude iron	%	+ Flux[2] → Refined Iron	%
TiO_2	34.8		TiO_2	71.9	Fe	98.05	Fe	98.51
Fe	40.3		FeO	8.9	C	1.13	C	1.19
P_2O_5	.015		Cr_2O_3	.25	Si	.08	Si	.15
S	.32		V_2O_5	.52	P	.030	P	.030
Cu	.02		MnO	.19	S	.61	S	.040
V	.16		MgO	5.2	Mn	Tr	Mn	Tr
Mn	.11		Al_2O_3	6.2	Ti	Tr	Ti	—
Ni	.02		SiO_2	5.7	V	None	V	—
Cr	.08		S	.22	Cr	.05	Cr	.08
CaO	.48				[2] Flux added:			
MgO	2.9	[1] Flux added:			CaO	130 lb/ton	25 coal	
Al_2O_3	2.8	Coal	285 lb/ton		Others	48 lb/ton	5 anorthosite	
SiO_2	3.4						18 sand	

Typical metallurgical balance sheet for 1500-ton a day operations: 1,500 tons ilmenite plus 215 tons coal are expected to produce about 660 tons titanium dioxide slag plus 480 tons refined iron.





INSIDE THE SMELTER. Buckets standing before tall smelting furnace at left receive titanium slag and iron respectively. Slag goes to slag casting machine, and iron goes to electric refining furnace shown in photo at right.



How To Stimulate Production of

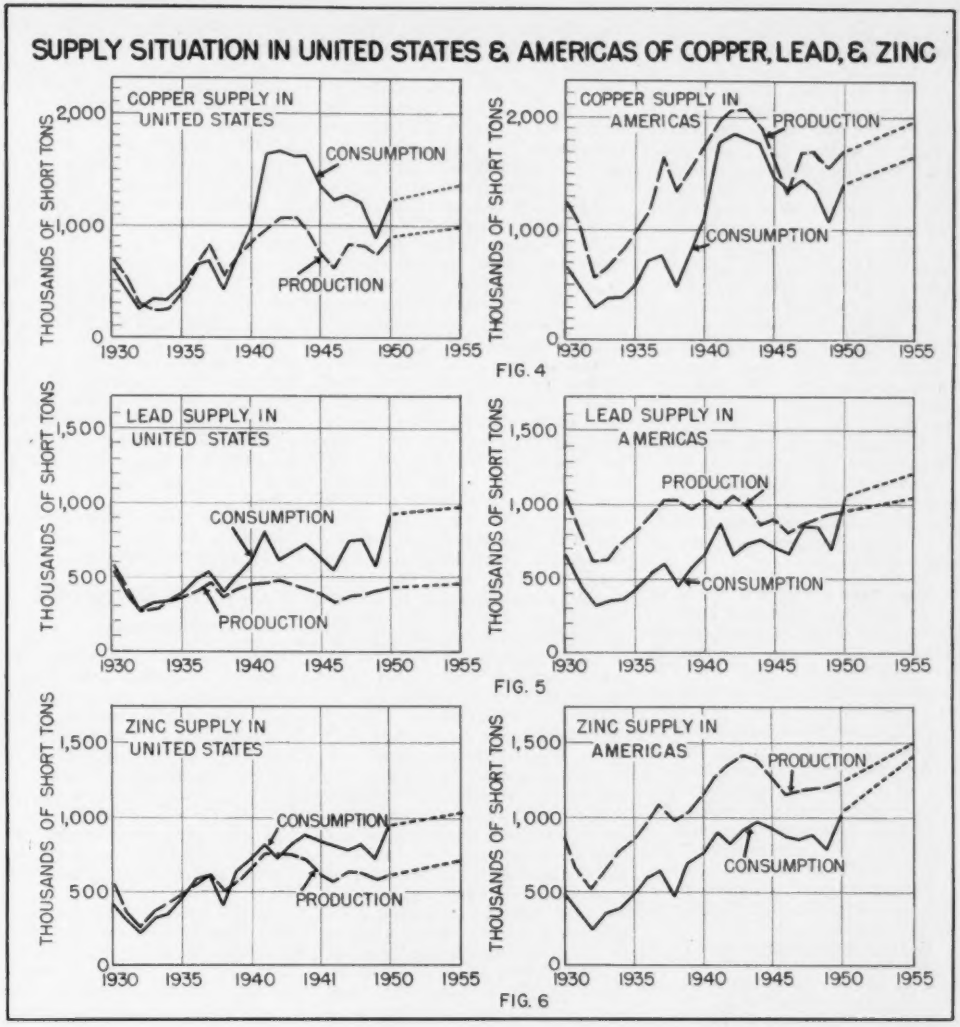
CHARLES WILL WRIGHT
Consulting Engineer
and
LESTER G. MORRELL
Mining Engineer

NEXT TO STEEL, an adequate supply of base metals is vital for national defense. The Americas are fortunate in possessing the major sources of copper, lead and zinc. However, it is also important to prevent the export of these vital commodities to countries that are building armament industries for world conquest.

Most of us now realize that our increasing consumption requirements cannot be met unless a united effort is made by each government to facilitate the flow of funds necessary to increase the metal output from old as well as newly discovered ore deposits; and to break down many of the border barriers, including the high export and import taxes that delay and often prevent deliveries from producer to consumer.

The Americas are not so badly off as many of the countries in the Eastern Hemisphere. The United States, however, the main consumer of these metals, is none the less vulnerable as the sea lanes from

A summary of this paper was presented at the Third Congress of the Pan American Institute of Mining Engineering and Geology in Mexico City on Oct. 31, 1951.



Base Metals in the Americas

Chile, Peru, and Argentina would be open to enemy submarines in case of war.

The Position of the Americas in the World Picture

Copper. World production of copper has doubled during the past 20 years. (Fig. 1.) Growth has been approximately uniform in both Eastern and Western Hemispheres with the West producing nearly two-thirds of the total. Indications for the ensuing five years are that this growth will continue at 4% per year. With the entry of new Peruvian and Chilean copper mines into the picture and increased output from the Chile Copper Co.'s mine, the proportion from the Americas is expected to rise.

Copper consumption, primarily due to a growing use of electrical equipment, has expanded throughout the world. The highly industrialized areas of the world—the United States in the Western Hemisphere, and Russia, Japan and Western Europe in the Eastern Hemisphere — have split the world's consumption of copper on a near 50-50 division. Because of the present price differential, aluminum is being substituted for copper in transmission lines and in the automobile industry.

(*Continued on next page*)

Lead. During the past 20 years, world lead production has averaged consistently about 1,500,000 metric tons a year (Fig. 2). The Americas have accounted for over half of the total since 1934. As a result of higher prices for both lead and zinc, they are expected to produce an even greater portion of the world output within the next few years. The general outlook is that the supply of lead will be limited and increased efforts toward conservation and secondary usage will be necessary.

Since 1943, consumption of new lead has been divided about equally between Eastern and Western Hemispheres. The bulk of America's mine production is consumed by United States industries. The rest of the world's production goes to European and Asiatic manufacturing facilities. A review of two decades shows an increase in United States usage compensating a corresponding decrease in Europe and Asia.

Zinc. Mine production of zinc in the world has increased steadily in the past 20 years, and between 1950 and 1955 a somewhat greater increase may be expected. The Americas contribute over 60% of the world's zinc output, of which United States mines supplied 620,000 tons in 1950. But the United States output may shortly be surpassed by the combined production of other American countries, with Canadian mines supplying a large part of the increase. Eastern Hemisphere primary sources have approximately doubled their volume of production since the early thirties.

More primary zinc is consumed in the Americas than in European and Asiatic countries, as shown by Fig. 3. The United States consumption of new zinc in 1950 was 960,000 tons. Of this, 36% was imported, 90% of which was from American countries. The differential, however, is not large and may be nullified by a more extensive re-usage of the metal in Eastern Hemisphere countries.

New Sources Within the Americas

Large tonnages of low-grade copper ore have become ore reserves at the operating mines because of the current high price paid for the metal. At existing price levels, United States production of copper is expected to increase. Prominent in this expansion are: The San Manuel orebody in Arizona, the White Pine deposit in Michigan, and Anaconda's Greater Butte Project in Montana. Canada's copper output has also grown steadily during recent years with the establishment of new mines and plants. International Nickel, the largest Canadian copper poducer, is expanding. Important orebodies, such as the Sherritt Gordon, are being prepared for exploitation in Manitoba; some on the Gaspé Peninsula in Quebec; and in other parts of the country many small mines producing base metals are being developed.

In Latin America, some recent copper developments are overshadowed by the extensive program of the Chuquicamata mine in Chile. This single mine may, in the near future, win first place for South America among the copper-producing continents. By 1955 the annual copper production from the American republics may be conservatively predicted to exceed 2-million metric tons. The heavy world demand which was instrumental in elevating the official price from 18¢ to over 24.5¢ per lb. in 1950, appears firm for the future. Defense construction programs, augmenting the normal industrial requirements, assure ready markets in the Americas and in the Eastern Hemisphere.

Lead is perhaps the most critical of the principal base metals. Supply shortage has caused a greater relative price rise in lead than in either copper or zinc. This has stimulated the exploitation of reserves heretofore unprofitable but there are no outstanding prospects as in copper. Canada appears to be on the threshold of greater lead production, as a result of increased activity among the small mines producing complex base metal ores. There is no justification for anticipating appreciably greater output from the United States, Mexico or South America. It is possible, however (and the same may be said of copper and zinc), that organized prospecting of large areas in South America known to be favorable for mineral occurrences may yield discoveries that could radically alter the lead outlook. Meanwhile, the people of the Americas must conserve and make full use of scrap supplies. The United States looks to Mexico, Canada and Peru for the bulk of its Western Hemisphere imports. By including Australian production, the Free World sources of primary lead outweigh any possible combination of Communist-controlled sections of the world.

The price increase of zinc from 9.75 to 17.5¢ per lb. in 1950 and to 19.5¢ in 1951 brought about the reactivation of many old mines and the energetic development of low-grade deposits, particularly in Canada. Of particular interest is the Barvue mine, Quebec, with estimated reserves of 16,900,000 tons containing 3.3% zinc. Plans are being made for a flotation plant of 4,000 tons daily capacity. The full impact of these developments will be appreciable from 1952 on, when substantially greater zinc production may be expected in the American continents. The future predominance of the Americas in zinc is thus assured, and with the addition of Australian facilities, the Free World will have access to not less than 75% of the world output.

Normally United States industries consume about half of the world production of zinc.

Organized Cooperation Necessary

The world need for metals has created a marketing outlook that is unsurpassed in industrial history. As a result, venture capital in United States and Canada is abundant, and directorates of wealthy companies are eager to invest in new enterprises in foreign countries. American countries offer private investors the most attractive field on the basis of geographical location and Free World loyalty.

On the other hand, certain of these countries do not look with favor upon the entry of foreign exploiters of their natural resources. The objection is usually based on a local policy of industrial isolation or in fear that their assets will be exploited without adequate compensation. Furthermore, United States and Canadian investors consider some Central and South American countries as unfavorable risk areas because of unstable business conditions or prohibitive tax and exchange regulations. The solution lies in the encouragement of free enterprise within the American republics and in a continent-wide mineral policy.

The features of such an understanding would include the fixing of definite periods over which taxes, tariffs, and exchange rates would not be altered, and full consideration for the inividual business rights of both investors and

employees. This will provide the basis for far greater development in underdeveloped localities through private initiative. It would make long-range defense planning secure and serve to unify the Western Hemisphere in mineral economy and in the elimination of the weaknesses which contribute to political and economic instability.

The United States Government has taken initial steps in mineral cooperation through various foreign-aid programs and recent reductions in tariffs on mineral products.

Vital To Expand Mine Development

The charts presented show the need for greater expansion in exploration and development of base metal sources within the Americas. Through the Defense Minerals Administration a start was made within the United States to aid owners of undeveloped ore deposits by advancing the major part of the funds needed to carry out exploration projects approved by the regional representative of the Bureau of Mines and the Geological Survey. An appropriation of $5-million was made. These projects, however, are not expected to contribute important tonnages to annual output. More important are the larger developments, such as the White Pine copper deposit in northern Michigan, the Eureka Nevada deposit in Nevada, etc., which will require a few-hundred-million-dollars. Although high metal prices are an incentive for capital investment, private capital hesitates to take the entire risk because of the government-controlled prices for base metals, labor demands for increasd wages, and higher taxes.

Within the Americas the most favored country for mine investment is Canada because of its liberal mining laws and relatively low royalties and income tax rates on metal mining operations. Peru has recently issued a new mining code and established more favorable exchange regulations and income tax rates to encourage private enterprise to invest in new mine developments. These examples might well be studied by the other countries with potential mineral resources.

The opportunities for investment in mine development projects in Latin America are many, particularly in large low-grade deposits. They require careful selection by competent engineers. Such developments are dependent upon more liberal mining codes, and reduction in taxes and trade barriers in Latin America as well as adjustments in United States tariffs. In recent years, because of past experience, United States mining companies and investment firms have shown little interest in risking capital in Latin America. Now, however, as the United States is confronted with urgent need for many of the base metals, let us hope that private capital, when given the necessary governmental guarantees, will have the acumen to participate financially and technically with the mine owners in the Americas. Most Latin American countries have laws which prevent a foreign company from acquiring a controlling interest in mine property. But if a mining project is a good risk, if the investment is guaranteed by the local government against confiscation and excessive taxation, if the investor is assured that his profits are payable to him in dollars, and if he has confidence in the executive personnel of the organization, controlling interest in the business is not essential. His investment will form a part of the whole investment that is protected against discriminatory action and adverse political propaganda by the local majority shareholders. As added protection, United States mining companies want financial participation in the form of loans from our government agencies in their ventures abroad.

Two years ago Herbert Gaston, chairman of the Export-Import Bank, outlined a plan for guaranteeing private American investment abroad, as follows:

1. The convertibility of earnings from investment in a foreign country into dollars, and the transfer of dollars to the United States.

2. The guarantee against confiscation or seizure without prompt and adequate compensation.

3. Capital investment to be eligible for guarantee, whether it be in the form of cash, equipment or other facilities, specialized services, or any other outlay of value.

If passed by Congress, this plan will reduce greatly the existing hesitancy on the part of capital to ventures abroad.

The most encouraging set-up to stimulate greater activity in the mineral industries in the United States and abroad has been the creation by executive order of the Defense Materials Procurement Agency. The functions of the General Service Agency, the Defense Minerals Administration, the National Production Administration, and the Economic Cooperation Administration are to be placed under the general direction of the new DMPA and thus action on mineral development projects will be expedited. During the last few months of 1951 the Defense Materials Procurement Agency approved several important mining projects within the United States to be financed in part through RFC.

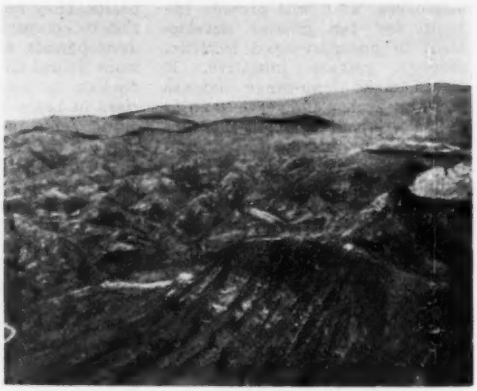
United Effort Needed

In projecting the production and consumption trends for the base metals it is evident that the rate of consumption is rapidly exceeding that of production and that the United States, being the greatest consuming country, is in real danger of being deprived of its essential foreign sources of supply. It is also evident that the United States Government's policy is contributing to base metal shortage within the United States because its official import prices for the base metals are below the world price levels. Thus the tendency among foreign producers is to seek foreign markets rather than export these metals to the United States. Thus far, higher metal prices have had little effect in stimulating increased mine output within the United States as most mines are being worked at maximum capacity. Also because of labor demands and increasing taxes, the mining companies hesitate to expand plant capacities. Many of the large companies are reluctant to step up the rate of exhaustion of their ore reserves during a period when profits are largely expropriated. The present tax on any additional profit from expanded operations is about 80%.

The Inter-American defense program contemplates increased base metal production within the Americas. This can be accomplished only by the establishment of a more favorable atmosphere within the Americas toward private enterprise by changes in exchange controls, taxes, tariffs, labor regulations, and greater protection for the mine investor. Not until there is a united effort among the American republics to make such changes will the necessary development of the potential base metal deposits be carried out.

From the air, the prospector can cover more territory faster, as in this

IF YOU TRAVELED BY CAR NEAR WICKENBURG, ARIZ., this is what you would see. But little would you note that beyond Picacho Peak lies mineral wealth.



BUT IF YOU HAPPENED TO HIRE A LIGHT PLANE and scouted the country beyond Picacho Peak (right), you would notice some very interesting pegmatite outcrops.

How A Bird's-Eye View From A Plane Makes Prospecting Easier

ROSCOE J. WHITNEY
Leominster, Mass.

1918—AVIATION SECTION, Signal Corps., U.S.A.—Flying Cadet Training, Park Field, Millington, Tenn. "If you get off course and lose your way, be sure you're east of the river, spot a railroad, fly along it until you see a railroad station, then fly down by it, read the sign and check your blueprint." (We didn't have much in the way of maps, only sketchy blue-printed strip maps and a very general overall map of the Memphis area.)

Translate that into "If you want to locate rock formations of a specific type—fly until you spot them—then scout out the best way to get to them on the ground." If you have some idea that a scale model of an area in *exact* detail and color could be helpful in prospecting, just use your imagination a bit; that is actually what you see when flying with your eyes and mind open. Of course you can control the scale by flying high for a small scale, scanning many square miles at once, and lower for large scale and great detail—and that "model," remember, is accurate to the minutest detail.

I want to emphasize here that this use of the small plane will be effective only to the prospector who knows his job on the ground. It won't help the inexperienced. If you can't recognize your rock formations on the ground—don't expect to do so from the air.

When prospecting for any ore, the first essential is to find favorable rock formations and conditions similar to those which have been productive of it elsewhere; i.e., "In regions where there are copper deposits, iron-stained outcrops are explored in the search for copper," (Emmons—Principles of Economic Geology). If you are prospecting for any of the pegmatite minerals, i.e., feldspar, mica, beryl, tungsten, tantalite, columbite, the lithium minerals, etc., you've got to look for them in pegmatites. In other words, *first* "catch your pegmatite." Hence, if you can cut down time spent looking for favorable formations and concentrate your field work looking at pegmatites, you will increase your chances of finding ore deposits tremendously.

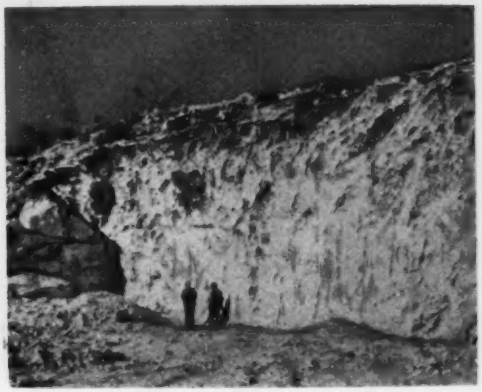
A prospector who can spot specific formations on the ground will be able to identify many of them from the air, and apply his experience gained on the ground in many ways. Coal operators have spotted coal veins by flying over territories adjacent to known deposits. Rock textures and variations, schists from granites, in some cases even gneisses from granites, can be distinguished. Faults can be traced in many instances better than on the ground, contact zones can be followed, etc.

Anyone can afford to try out a small airplane—costs are about $10 for 100 mi.! This article is written mainly for the prospector who cannot consider highly technical and expensive aerial surveys, etc., and yet he's the man who has so far found many of the mineral locations in the world and who will go on doing so. The professional geologist, too, can realize much from these suggestions—as some already have.

Let's take an area—say in New England where there are, or have been, some productive mica or feldspar mines. The potential value of a pegmatite is so extremely variable that no one can afford the time or money to make a detailed search of very many square miles unless most of the time is to be spent *examining* pegmatites, not in wondering where they are or looking for them on foot. Hence nearly all pegmatite mines so far developed have been found by chance, local farmers, or woodsmen bringing them to the attention of possible operators. That there are one or two feldspar or mica mines here is enough to indicate that we're fishing where there's fish.

example, where discovery by air resulted in the mine below.

AND A LITTLE CLOSER EXAMINATION OF THESE OUTSTANDING white pegmatite bands, miles in width and length, might induce you to send in ground crews.



IF YOU DID, you might be fortunate to be the owner and operator of a huge deposit of fine block feldspar like this one which was discovered and developed exactly this way.

Spend some time on the ground —enough to be sure you know what the country rock and these pegmatite dykes look like at close range. See how far away you can spot them along the level, 50 ft., 100 ft., 500 ft., or more. Remember this: in good clear calm flying weather you can easily and safely fly over most places at 100 ft. to 500 ft. above the ground. Don't worry too much about brush and trees—they don't grow very thick on bare rocks. You won't see much from the ground either unless the bedrock *is* exposed.

Now go to a local airport, and you'll find one nearby in almost every part of the United States. "Nearby" of course means a lot closer in New England than it does in Arizona. (I spotted one pegmatite near Wagoner, Arizona—now the Flying W Mine of Bon Ami Co.—found from the air the best way to it by jeep and horse, and, while it was 20 minutes by plane back to Wickenburg, it was 70 mi. around by jeep and 5 mi. after that on horseback.)

Rent a small plane—a Piper Cub or Aeronca—or if the location is more than 40 to 50 mi. from the airport, a Cessna 140 or equivalent. Remember you're going as the crow flies and faster. Let's figure your first trip is 20 air mi. from airport to area. You'll cruise at about 90-100 mph, 40 mi. there and back, i.e., not much over half an hour anyway. It will cost you about $10 per hour with a good pilot.

Now have your pilot fly at a comfortably slow speed, i.e., 50 mph, back and forth over the ground and mines which you've examined on foot. Then, when you have some perspective, start scouting around the area. If you've a topographic map, a notebook, and a small camera you'll be busy and find that a flight of one to one and a half hours is enough. I wouldn't make a first flight over one hour, as it will take several flights before you can catch up with yourself, i.e., absorb and interpret what you see, make your notes, photographs and map checks. You'll really see plenty—it could be plenty of nothing you want—and that too saves footwork.

As to cost—plane and pilot $10 per hour, plus your own time. Miles traveled, 60-100—say, 75 mi.; that is, 100 mph across country and 50 mph scouting. A two-hour flight at $20, plus or minus, equals 150 mi. Estimate 50 mi. to location and back and 100 mi. covering area.

Until you find a stop to detail you'll fly high enough to see a mile each side of your plane so you can cover a strip or total strips in two hours of 100x2 or 200 sq. mi., i.e., 10¢ per sq. mi.—cheap enough. From here on, it's up to the individual as to how much detail, equipment, etc., he wants to add to the above. Also, don't be too technical about navigating. You should pick your weather—as clear and as calm as possible and near the middle of the day for high sun.

Go as far as you want to with detail maps or charts—even a good road-map will do in many places. Your local pilot will know the general area well enough and you should, for your first few flights, fly over ground with which you are fairly well acquainted.

In the New England pegmatite areas, where I was familiar with the terrain, many previously unnoted features showed up, such as the unsuspected extent of many pegmatite-bearing areas. There was one operating feldspar mine in Raymond, N.H., an area until recently not known to have workable feldspar deposits. From two flights it was determined that this pegmatite-bearing area extended N.E.-S.W. for 23 mi. and at no point was over 1½ to 2 mi. wide. Most of the rock exposures were easily seen and those with pegmatite indicated on topographic maps for ground examination. Subsequent groundwork checked the above, and we found that no areas of pegmatites were overlooked and actually very few individual pegmatites. These in every case were indicated by association with those visible from the plane.

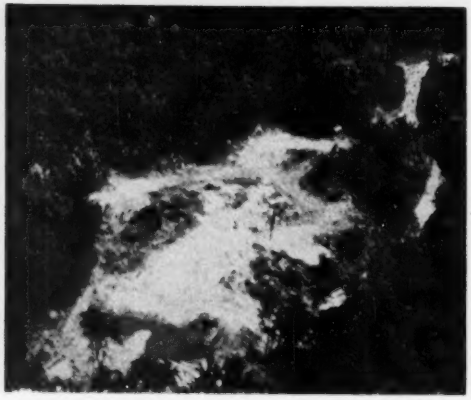
A number of mining options were taken and development work done, netting three good mines. Using the small airplane cut manhours in the field to a marked degree by definitely limiting the territory to be covered and highlighting the pegmatite concentrations within those limits.

This particular phase showed up later in the Hualpai Mts. in Arizona when a mine owner and operator told me that "this particular pegmatite-bearing formation extends 2 mi. on the strike and is over ½ mi. wide!" The next day I flew over it and found that its actual extent was not less than 7 mi. long and 2 mi. wide!

Another type of procedure was also indicated near Wickenburg, Ariz. It was learned that tungsten had been mined in pegmatites

Pegmatites can be observed by air in Maine and New Hampshire also.

PEGMATITES IN MAINE, bearing huge beryl crystals like these, can be spotted readily from the air to localize area for favorable prospecting with minimum loss of time.



AND IN NEW HAMPSHIRE a white gash in the tree-covered countryside may be the clue to a producing pegmatite mine like this near Raymond.

in the San Domingo, Wash. area. Nothing was published on the extent of the pegmatites nor the formation in which they were found. No detail maps or charts were to be had so I carried the Phoenix and Prescott Sectional Aeronautical Chart for my preliminary flight, no notebook and a 35 mm. Leica camera.

This time I flew over before doing any groundwork. It was immediately evident that we had found a little-known and, from the air, a large and very promising area of pegmatites. Locally, in the Southwest, pegmatites, if of any size and evidence, are called "blowouts" or "quartz blowouts." Very seldom do they turn out to be merely quartz blowouts.

This whole area, from the air, looked so promising, that when my crew, after a two-day preliminary scout by jeep, reported that they saw only fine-grained and evidently useless pegmatites, I had my doubts. However, at this point I took their say-so, as I knew they reported what they saw. Several days later on showing them the aerial photographs made on my flight of the more promising pegmatites, I was astonished to find that the crew had completely missed all of these dykes. We couldn't at first figure out how they could have missed these dikes. Another flight check indicated that none of the main trail or washes came within sight of these pegmatites.

To impress them just how near we all came to making a really bad "bull," I flew my crew foreman and one of the men in separate flights over the area, showed them what I had seen and had them show me where they went and what they saw. We spotted trails to all the dykes, then I went into the area with them in the jeep and power-wagon. From here on we all knew exactly where we were at and without wasting any time covered this area of our 150 sq. mi. and which, as it turned out, had the answer to our expedition.

The Bon Ami Co. has here now several mining claims and an assured Western reserve of No. 1 block potash feldspar.

Incidental to the feldspar found was one bismuth location, the first shipment from which I understand was paid for with a $15,000 check, several other locations containing beryl, tantalite, columbite, amblygonite (the first found in Arizona) spodumene, some scrap mica, and barite. Some copper-bearing areas were seen but not investigated.

As a contrast to the above, where good prospects were located, the following résumé of a carefully planned and executed five-day reconnaissance in Southern Arizona shows how fast and effectively marginal areas can be covered—in this case we were looking only for and at pegmatites.

Territory covered extended from Cashion just west of Phoenix, west 30 mi. to Hassayampa, south 100 mi. to O'Neil Pass and Aqua and Aqua Dulce Mts. on the Mexican border. east 100 mi. to just beyond Sells on the Papago Reservation, north 80 mi. to Casa Grande and back 50 mi. to Cashion.

Flying time was 14 hours and 35 minutes, or approximately 1,120 mi. Ground crews drove jeep and power-wagon 572 mi. with full field equipment, i.e., tents, grub, etc.

All areas indicated on the Arizona State Geological as potentially pegmatite-bearing were scouted by plane. Twenty-four mountain ranges were covered as well as the desert flats between. This, excepting one small area near Phoenix, i.e., Table Top and Antelope Mts.

Nine good-sized pegmatite showings were spotted, examined, noted and discarded. It is unlikely that any sizable pegmatites were overlooked; certainly no existing pegmatite-bearing areas were not seen. Much ground time was saved by lying one of the ground crews over sites to be checked, thereby spotting shortest access trails.

The area covered is equivalent of roughly 40x150 mi., or 6,000 sq. mi. at a cost of less than $500.

The above should suggest to any prospector or geologist in the field many ways of saving time on the ground and of making his field work far more productive.

Just as our Army's ground forces would be handicapped without its liaison type planes, so is today's prospector when he does not take the available advantages of such planes.

The following, admittedly incomplete, checklist will suggest some good applications: preliminary reconnaissance of known and unknown areas—large and small exposures, geological formations, working and abandoned mines, prospect holes, camp sites, access roads, trails checking supposed inaccessible areas, sketch mapping, oblique photographs, tracing faults, checking ground crews.

AT AVLAKI MINE near Laurium, modern trucks work in ancient surroundings. Mining is mostly underground.

ANCIENT METHOD—NEW MINE CAR. Hand sorters, not working for Mediterranean, discard low-grade hunks.

Mediterranean: A New Lead-Zinc Operation

IN 1947, MEDITERRANEAN MINES, INC. started an exploratory operation in zinc-lead-silver mining on the southeast tip of the Attican Peninsula of Greece (about 35 mi. southeast of Athens). In 1951, the company completed a modern 200-ton flotation mill, and by October was operating it at full capacity.

About Mediterranean. It is a new company, controlled by Ventures, Ltd. (Canadian) and financed approximately 50-50 by Ventures and ECA. (The French concern, Cie. Francaise des Mines du Laurium, is also exploring and developing large holdings in the area.)

Ore. Zinc, lead, and silver sulphides occur in contact deposits between schist and limestone. Mediterranean will direct development along three separate contacts. Latest published reserves (*Skinner*, 1951) include 300,000 tons of ore averaging about 5% lead, 6% zinc, and 2.5 oz. of silver; also, 2,500,000 tons of tailings averaging about 3% lead and 1.5 oz. of silver.

Milling. In July, 1951, Mediterranean completed the new mill, a conventional selective flotation mill which produces a lead concentrate (silver-bearing), and a zinc concentrate. Metallurgists are working on plans to extract pyrite by means of a third circuit.

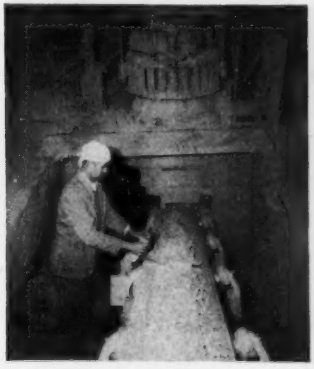
Production. The mill operates three shifts per day, seven days per week; it processes about 210 daily tons of ore. Each month it produces about 250 tons of 55%-lead concentrate and 285 tons of 52%-zinc concentrate. These are currently being smelted in Belgium, and the metal then is being shipped to United States stockpile.

Plans. Mediterranean's current operation is experimental in that results of exploration and operation will determine the size and scope of the company's final operation. One important thing that the company has found in this preliminary operation is that Greek men, though largely untrained in mining and milling, become intelligent, industrious workers after a minimum of training.

Photos: Courtesy of ECA Mission to Greece

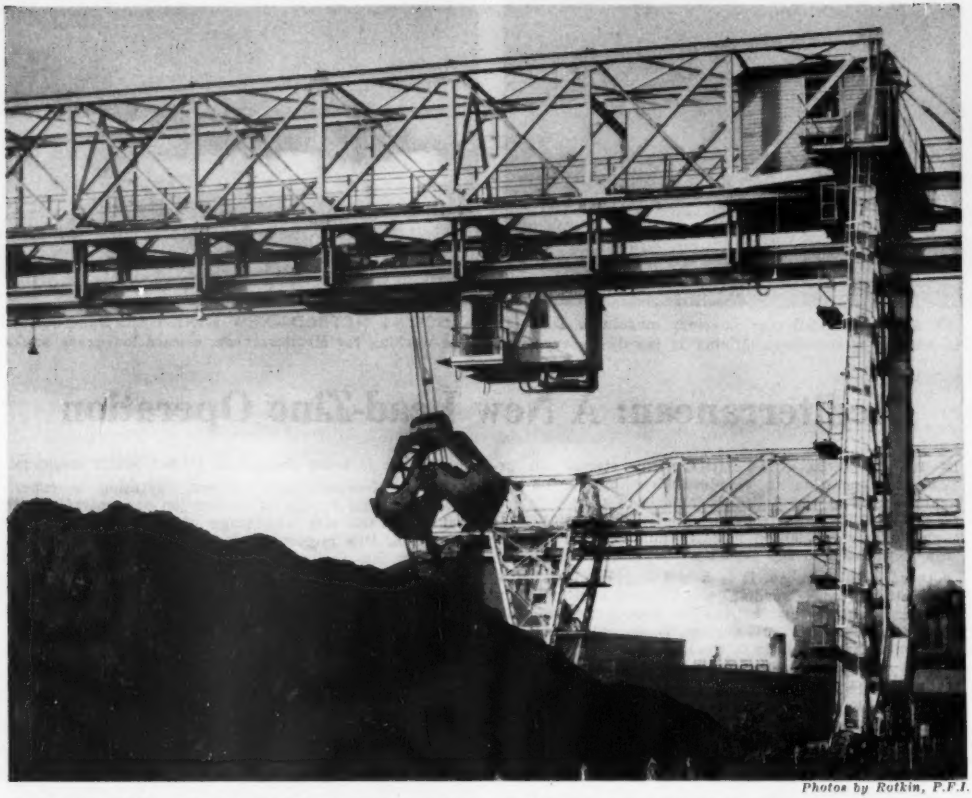
BUILT UNDER MARSHALL PLAN, Mediterranean's 200-ton mill overlooks the Aegean Sea. It was completed in 1951 as a test-production unit.

MILL SUPERINTENDENT W. D. Hubler checks in ore from mines.



SAMPLER periodically cuts a slice from belt leading from cone crusher.

FLOTATION OPERATOR monitors lead cells to insure a clean product.



Photos by Rutkin, P.F.I.

GANTRY CRANES AT STOCKPILE, long idle, return to action. As railway cars from the mine dump ore on the stockpile, cranes and dozers distribute it on the pile. Then, Gantries work it from pile to plant as needed.

Nicaro Resumes Production

REHABILITATION . . .

R. CONNOR, resident project manager, Frederick A. Snare Corp.

PRODUCTION . . .

DR. H. EBBINGE, assistant general manager, Nickel Processing Corp.

ON THURSDAY, JANUARY 31, the Nicaro nickel plant in Oriente Province, eastern Cuba, resumed regular production. In the first day's run, with four of its 12 furnaces operating, the plant turned out nickel oxide containing five tons of metal. Nicaro, which had been dormant since Mar. 31, 1947, has been re-activated to help meet the strong rearmament demand for nickel.

The schedule at Nicaro calls for bringing the plant, step by step, into full production, which would be reached about June 1, 1952. At that time, producing oxide equivalent to 15,000 annual tons of metal, Nicaro will be supplying about 8 or 9% of the free world's supply of nickel.

Key to successful operation of

the Nicaro project is the process by which unbeneficiated lateritic nickel-iron ore is converted to refined nickel oxide. That process (variously called the Caron, Nicaro, or Freeport process) is the most economical method that has yet been used commercially on such ore.

Four companies have cooperated to bring Nicaro back into production:

Nickel Processing Corp. operates the plant and mine under an agreement with General Services Administration. The firm, a new one, is a joint enterprise of N. V. Billiton Maatschappij of Hague, Netherlands, and National Lead Co., with Cuban participation.

Cuban Nickel Company, Inc. Owned by the United States, this corporation owns the plant and its supporting facilities, including the town and its utilities.

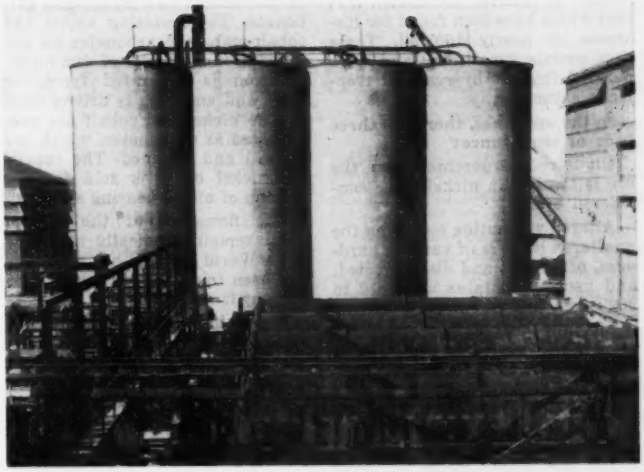
Frederick A. Snare Corp. Under contracts during World War II, this company built Nicaro. Today, also under contract, Snare is rehabilitating it.

Nicaro Nickel Co. This firm, a subsidiary of Freeport Sulphur Co., operated both the mine and metallurgical plant during World War II. In the current operation, Nicaro's only participation is as owner of the ore reserves.

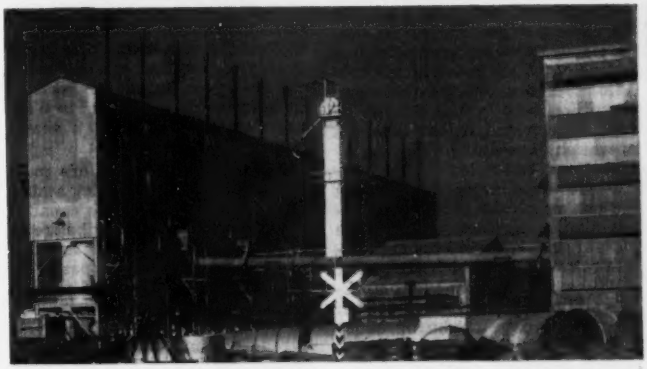
Nicaro returned to production 60 days ahead of schedule. Jess Larson, Administrator of GSA, patted the back of one of the men responsible for this speed when he said: "Largely through the coordinating effort of Clay P. Bedford, who has acted for ODM and DPA in aiding the work at Nicaro, [the assistance of ODM, DPA, NPA, and the Munitions Board] has been channeled into an effective force which has helped materially in restoring Nicaro to defense production."

Mr. Bedford's contribution was imaginative expediting: When he landed in Cuba, the plant was largely ready to go except for certain critical items of equipment, and the men to run the operation. He cut through tape and channels . . . got the equipment. Getting the men was a tougher problem. Available housing was filled with rehabilitation crews; it was useless to bring in the men until housing had been provided. Bedford solved the problem by enlisting the cooperation of the navy, which demothballed a 700-man barracks ship and floated it into the harbor at Nicaro.

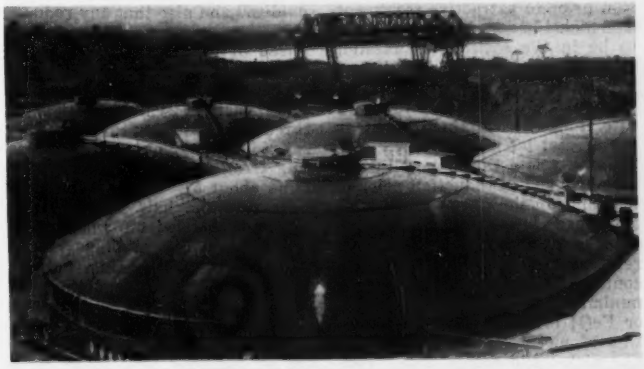
Nicaro's source of ore is a great



DRY-ORE STORAGE: Finely ground dry ore enters and leaves these silos by pneumatic power. Flow is from drying and grinding (left) to silos (center) to reduction (right) to cooling (foreground) to wet process.



GAS FOR ORE REDUCTION: 14 stacks are from Wellman-Galusha gas producers (12 normally used) which furnish gas for reduction roasting.



THICKENERS IN LEACHING SECTION are covered to minimize ammonia loss. Nickel dissolves as complex nickel-ammonio ion in ammonical solution.

blanket of lateritic nickel-rich iron ores which have been found for distances of nearly 100 mi. These ores overlie serpentine, and were derived from it by residual tropical weathering.

In the ore zones, there are three beds of importance:

Unaltered serpentine below the ore is too low in nickel to be considered ore.

Altered serpentine overlying the unaltered layer is of varying hardness, often soft and disintegrated, and usually contains about 10 to 20% iron and about 1.6% nickel.

Limonite, capping the altered serpentine, averages about 50% iron and 1.2 to 1.4% nickel. The top 3 to 8 ft. of limonite is usually too lean to be ore. It is stripped and stockpiled as a possible future source of iron.

The ore zone, including both limonite and altered serpentine, averages about 15 ft. in thickness.

Centering at about 8.5 mi. from the plant is the Levisa group of orebodies which will furnish ore for several years. Levisa consists of six deposits grouped within a radius of 3.5 mi. Proved and probable reserves there are now about 27-million tons (nearly 3.5-million tons were mined in the previous operation) averaging about 1.46% nickel and 36.5% iron.

Nickel Processing Corp. mines the ore mainly by truck-pit methods similar to those used on the Mesabi Range. Trucks load the ore into railway cars which are pulled in 12-car trains to the plant stockpile at Lengua. At full operation, the mine will be producing about 5,600 daily tons of wet ore (35% water) daily.

The great problem in treating Nicaro ore is that it (to date) has defeated all attempts at beneficiation prior to extractive treatment. The nickel in serpentine is thought to be in the hydrous magnesium silicates garnierite, $H_2(NiMg)SiO_4.nH_2O$; or genthite, $(2NiO)(2MgO)\ 3SiO_2.6H_2O$. In the limonite, it may be contained as NiO in the crystal lattice.

Caron was a Dutch metallurgist who believed in reduction prior to leaching. In the Caron process, as developed by Freeport Sulphur Co., the nickel and cobalt are first reduced to metal in a carefully controlled reducing roast which minimizes reduction of iron to Fe or FeO; it also minimizes formation of nickel carbonyl, $Ni(CO)_4$. The nickel and cobalt, freed from the complex compounds, are reoxidized and leached by a solution of ammonium and ammonium carbonate. The resulting nickel and cobalt-ammonio carbonates are soluble in an excess of ammonia. Solution is separated from the pulp, and ammonia is driven from it. The nickel and cobalt are precipitated as carbonates, which are filtered and calcined. The resulting nickel oxide is sold for the making of nickel-bearing steels.

The flowsheet of the Nicaro plant remains basically the same as in World War II, but efficiency has been improved. Briefly, here's the way it works:

First phases of processing are mechanical and physical. Ore is removed from stockpile, crushed to minus-4-in., dried in rotary concurrent dryers, and ground to 95% minus-100-mesh. The ground ore passes to a system of storage silos from which it is pneumatically conveyed to the reduction roasters.

Reduction Roasting. The furnace section is one of the most critical in the plant. It consists of 12 22 ft.-6 in. by 17-hearth Herreshoff furnaces. They are fired by fuel oil low in sulphur. Ore is delivered to the top hearth. The reducing agent, producer gas, is made from anthracite coal in Wellman-Galusha producers; it passes countercurrent to the ore.

Cooling. The reduced ore must be cooled in a non-oxidizing atmosphere. The initial cooling agent is reducer gas which meets the ore on the 16th hearth of the furnace. Ore leaving the furnace passes to six rotary ore coolers and then is carried by inclined screw conveyors to quench tanks, where it is introduced into the ammoniacal liquor, and is then pumped to the leaching plant.

Leaching. Solution of the nickel and cobalt requires that it be reoxidized and also that any reduced iron be oxidized. Turbo-mixers ahead of each leaching thickener provide the necessary aeration. Leaching is done in three parallel lines, each of which consists of three 75-ft. leaching thickeners arranged for countercurrent flow. The fresh leaching solution contains about 5% ammonia, half as hydroxide and half as carbonate. Ammonia carried off with air is recovered in a scrubbing system. To aid in the thickening, pulp is passed through a magnetic field (magnetically flocculated) prior to each stage of thickening; since the pulp contains a high percentage of magnetic iron oxide, it is effectively agglomerated by the magnetic field. Leaving the leaching thickeners, the pulp passes to two parallel lines of washing thickeners; each line consists of four countercurrent 110-ft. torque thickeners.

Precipitation. Clarified high-nickel solution goes to Semet-Solvay stills, passing from top of still to bottom. Steam introduced at the bottom of stills passes up through the tower countercurrent to the solution, and extracts ammonia from it. With ammonia removed, the nickel precipitates as the green basic carbonate.

Product. The carbonate is thickened, filtered, and calcined. The resulting nickel oxide from the World War II operation averaged 76.93% nickel and 0.58% cobalt.

Previous Recovery. In the operation from the time Nicaro was completed, Oct. 15, 1943, until it was closed on Mar. 31, 1947, 3,323,075 tons of dry ore were processed. The ore contained 91,702,615 lb. of nickel, of which 63,571,414 lb. was recovered. The recovery was 69.32%. Nearly all the nickel which was lost was not soluble in the pulp.

Recent Improvements. Since the World War II operation, the furnace section has been improved considerably: The efficiency of heat exchangers has been increased; temperature control has been refined; Cottrell precipitators have been added to improve dust control. In the leaching section, efficiency in general has been improved, and pumping facilities in particular. In Jess Larson's words, "Nicaro is a better plant than it was at its shutdown five years ago. The restoration program added engineering and metallurgical improvements. . . ."

Speaking of Nicaro's future, Mr. Larson says: "When all 12 furnaces are working, the plant will turn out about 30-million lb. of nickel a year. This output will be 25% greater than the plant's operating capacity in 1947.

"A pilot plant is now being erected at Nicaro. If the experiments are successful, steps will be taken to revise the production processes leading toward an additional 10% or 3-million-lb. recovery of nickel and also the recovery of cobalt which is another critically needed metal. . . ."

Acknowledgement: Much of the information in this article has been abstracted from a report entitled "Review of the Nicaro Nickel Project, Nicaro, Oriente, Cuba, Planeor 690" submitted to the Defense Plant Corp. by Henry A. Tobelman and Harry J. Morgan.

Need more manpower? You'll be interested in . . .

Canada's D. P. Program

- **How It Was Organized.**
- **How New Miners Were Trained.**
- **How One New Canadian Likes It.**
- **How the Mining Companies Like It.**

V. C. WANSBROUGH
Managing Director
Canadian Metal Mining Association
Toronto, Ont.

AN IMMIGRATION PROGRAM to supplement mine labor in Canada was first launched late in 1947. It was initiated by this association acting on behalf of its member companies and from the beginning was worked out step by step in conjunction with the departments of Immigration and Labor of the federal government and the International Refugee Organization.

In the first instance it was directed entirely at the displaced persons camps of western Germany. A selection team, representing the industry and including a professional radiologist, was sent to Europe, visited many of the camps and carried out the screening and selection. High medical and physical standards were established with special provision for x-ray examination to ensure that the men selected were able to qualify for underground employment according to the requirements enforced by the Canadian provincial authorities.

Screening Effective

Security screening was in the hands of the Royal Canadian Mounted Police and, as the results showed, was very effectively carried out. In later stages of the movement the selection and screening, industrial and medical, were done on the industry's behalf by overseas officials of the federal government who were familiar with the special requirements of the mines.

Under this part of our program some 5,000 men were brought to Canada over a period of three years. In nationality they were for the most part Balt, Ukranians and Poles in about equal proportions. Married men came with single status, but arrangements were made for the later transfer of dependents, some 6,000 of whom were brought over.

As they were all charges of the International Refugee Organization, transportation costs were paid for by that body.

Expenses Advanced

Costs of inland transportation and some incidental expenses were advanced by the mines to whom the men were assigned, recovered by payroll deductions and later returned to the worker if he satisfactorily completed his employment agreement.

The mine undertook to give 12-months' employment and guaranteed that wages, working conditions and living accommodations would be the same as for Canadian employees. The immigrant undertook to stay with the mine to which he was assigned, or if for any reason transfer was necessary, at least with the industry for a 12-month period. Upon the completion of his employment agreement, the immigrant was at liberty to stay with the mine or to seek other employment.

Our experience has been that about 60% of the men chose to remain in mining employment. A number, of course, who were specially qualified professional or technical men moved into other fields more suited to their special training.

With very few exceptions the immigrants turned out to be excellent workers and, assisted by the efforts of mine management, local welfare societies, provincial education authorities and the Federal Department of Citizenship, have become well adjusted to Canadian ways of life and to the communities in which they settled.

During 1950 it became clear that the supply of physically qualified displaced persons was petering out and that immigrants would have to be sought in other directions. A survey showed that some 2,000 men would be needed during 1951.

To obtain anything like this number of men, various means and sources had to be used. Special plans were laid to recruit German nationals, and by the end of the year some 700 will have been brought to Canada under a plan whereby the mines advance the costs of ocean passage and such inland transportation costs as are required, repayable by the immigrant over the period of his employment agreement. The screening and selection overseas were done on the industry's behalf by officials of the departments of Immigration and Labor.

The Canadian Government during the year instituted an assisted passage loan scheme of its own to enable European immigrants to come to Canada, and some numbers of men, also mostly Germans, were obtained this way.

In addition, 500 Italians were recruited from a considerably larger group brought to Canada. Though many of them fitted in well and proved to be good workers, the general experience has not been as satisfactory as with other national groups, either with respect to their physical qualifications or their readiness to live up to obligations that they assume.

The balance of our requirements were secured from a general labor pool of displaced persons brought to Canada under the International Refugee Organization's auspices.

Miners Avoided

It was soon found advisable to avoid rather than to seek men who had mining experience in Europe. Such men through previous exposure to dust were apt to have difficulty in meeting the chest requirements. We have therefore sought men who had led healthy open-air lives and are accustomed to reasonably heavy labor.

It was found that where rejects were above 40%, prospective emigrants would not apply for entry to Canada as miners. Preselection

or a full understanding by the emigrants of the high standards of health kept rejects within reason on the final selection. The Canadian Government Immigration Commission endeavored to have alternate employment open to physically fit men who could not meet mining's special chest x-rays.

"Mining" is not an attractive term to the ordinary European. It is necessary therefore to put on something of a promotional campaign and to put in his hands material which describes in some detail the conditions of work and employment which he may expect, and the kind of life, with its social and recreational amenities, lived in a mining community.

It is also to be remembered that with the most notable exception of Italy, few European governments can or will encourage emigration, especially of their youngest and fittest men. It is necessary, and sometimes difficult, to make contact with the most enterprising and adventurous young men who are the best potential immigrants.

Finally, the screening and selection are most important because we are looking for good settlers and future citizens as well as good workers. Many of the displaced persons had suffered at the hands of the Russians, and so are a strong anti-communist influence. They have in general had a stabilizing effect.

In our Canadian venture we have been fortunate in this respect, and the industry's representatives have kept in the closest touch with the government officials by whom most of the selection was done.

It is felt that the movement of immigrants as a whole into the Canadian mining industry has been of great benefit. Many mines could not have reached their postwar productive levels without this addition to the labor force. At the same time, we are feeling our way along and can regard what has been done so far only as experimental. We are gaining by our experience and enlarging our European contacts.

Safe Training For New Miners

J. F. R. AKEHURST
Chief Engineer
Sylvanite Gold Mines, Ltd.
Kirkland Lake, Ont.

WITH THE POSSIBLE EXCEPTION of the period of the depression of the early thirties, turnover of miners has always been somewhat of a problem. It was seldom of a serious nature until the start of World War II. During the last two or three years of this upheaval, and continuing on up to the present, the attitude of government to gold has produced a very definite problem to our industry.

This same industry, which has been credited with carrying the ball during the depression years, was benched. Long after the war, it is still suffering, while other industries are able to meet increased costs with increased prices for their products.

The one-time favorable differential in pay for gold miners diminished, and an acute labor shortage, coupled with a very heavy turnover of underground personnel presented a serious threat to the economy, and safety, of gold mining operations, not at Sylvanite alone, but to every gold mine in the entire country.

To offset this problem, the industry was forced to look to European countries for manpower.

At Sylvanite, we received our fair share of New Canadians. These people arrived in groups of from two to eight. Their knowledge of mining was usually very limited, or nonexistent; their knowledge of English likewise.

There was quite a bit of mining still being done on the upper two levels of the mine, which was very suitable for use as a training area, and nearly all the phases of mining pertinent to operations in the rest of the mine were being carried on there.

We were fortunate in having a shift boss who is gifted with more than normal patience, coupled with a high regard for safety. To him was given the task of putting new men, hired for underground, through a period of indoctrination. It was to vary in length, depending on the ability of the "student." Every effort would be made to be sure that no one would be moved on until he was completely familiar with all types of work, short of actually running a machine.

All Now Trained

The advantages gained in the training school were considered to be such that for some time now, all persons hired, regardless of any previous mining experience, are first sent to the school.

One of the benefits of the school, not only to the new man but also his associates when he has been moved on to another section of the mine, is the elimination of a doubt, replaced by a feeling of trust that this man knows his job.

The arrival of a new man in the training area is a commonplace event, and it is taken by those working there as just another opportunity to help the most recent arrival to overcome the early difficulties of adjustment; there will probably be several still in the area who not long ago were in exactly the same situation.

At Sylvanite all men hired for underground, regardless of experience, start at muckers' pay.

When there are openings for machine helpers, runners, timbermen, etc., a notice is placed on the bulletin board indicating the fact, and the person with the greatest seniority of those who sign must be given an opportunity of not less than two weeks, and up to four weeks to show that he is capable.

In order to maintain a supply of machine men, a second phase of the school was set up.

A posting is made for applicants to sign for temporary or spare machine helper, the man selected to be eligible when the next vacancy occurs. The successful applicant is then sent to one of the stopes in the school area, where he works with an experienced runner until he is considered proficient. If at the end of this time there is no opening, he may be returned to his former job in order to make way for another trainee, but he will get the first opportunity when it occurs. The same procedure is followed if the posting had been for a spare machine runner, but in applying for a position of runner the applicant is required to have had previous experience as a helper. The experienced runner that he goes to work with for his training period gives him the opportunity to size up his work, and he is given a greater feeling of responsibility.

The policy that all promotion to running machines requires a trial period in the school has been very successful and effectively produces a supply of experienced miners ahead of actual requirements. Unless a most unusual exodus of miners were to take place, the continuity of smooth operations seems to be pretty well assured.

The Devil-Dozen Turns Out O. K.

Here are the unabridged comments of a New Canadian, a Latvian, trained in architecture, who came to Canada in March, 1951, to a job with Sylvanite Gold Mines, Ltd.

IT WAS ON THE 13TH MARCH 1951, as we came, (altogether 13 persons) in Kirkland Lake, to start our new work in the gold mines.

I am not superstitious, but I did not like this devil-dozen. I hope that all will be O.K.

After doctor's examination, which was more strong than in Europe, (one of us was unfit for the underground), we had to put in order all the things with the employment office, mine management, insurance, etc., and in the morning of the 15th March we had to begin our work in the Sylvanite mines.

Already from our new work-clothes, all other colleagues could know that we are the young gold-miners, and from some men we heard sneering remarks, but that has not made us anxious. Everything has his beginning, and the same we could say over our work. It was our first day in gold mines, but in Belgium we have passed three years in the coal mines, therefore we was more ready for this work than some scoffers between the miners.

All was new at the beginning and we observed with a large interest what happened around us. Soon we formed a connection with our next colleagues.

The lift leaded us down in underground, and also here was new for us. Not fastened ceiling in the station made us unsafe, but we feeled us more better than in coal mines where the fastened ceiling was insecure.

The first day I worked by pulling chute. This work is not hard, but only trouble is the big rocks, what are very hardly to split. And so working came lunch-time to dine, and I am pleasant astonished, as we had to go to the station for dine there. The precise time to dine, also toilets we had not in Belgium, but the best is that here are not rats, what in coal mines we could meet often.

We have speak about our first impressions and they was in some respects pleasant. I came to conclusion, that work, also classification and manners are better here.

On afternoon, the large rocks was blocked in chute and after manifold blasting we had to work in powder smoke what came after explosion, this is the worst thing that can be make better with a good ventilation, with few expenditure there can overtake greater productiveness and in the same time to take care for workmen's health.

The first day was passed, and happy about it all I got ready. I went to surface where the warm shower-bath increased our feeing of comfort.

The next days I spended also doing this same work and each day gave me a new experience.

On the fifth and sixth day I was motorman helper. After lifting up the sledge (hammer) 6½ hours I came to conclusion that this must be one of the hardest work here. I was tired but happy for the difficult earned $8.

Then followed my work as timberman helper, and I will say that this work is the best from all I worked till now. I can learn very much from my partner, who is working in mines more than 25 years. I like this work, but trouble are that here we can't earn more than $8 daily.

The first month is already passed. The greater privilege in comparison with coal-mines is that, here it is possible to work all time standing, but in coal-mines we had to work very often in 14 to 20 inches high place. And it is possible! The gas was reason wherefore it was forbidden to smoke in coal-mines. Here it is allowed, and all this circumstance makes our work in gold-mines more comfortable.

All our wishes are to become to machine helper, where it is possible to earn till $14 daily.

We displaced persons or New Canadians are coming here not for spend pleasant the time, but to afford a better future for our families, to soothe our employers with our behavior, and work, and become so friends for us and for our small and so much tormented country Latvia.

Two Companies the Program Is Helping

To The Editor

Engineering and Mining Journal:

With reference to your letter of December 27th, we have since December 1947 taken on about 160 immigrants on contracts varying between 10 and 18 months' service. None of the men had previously worked underground. Approximately 110 of these are still in our employ most of whom have not completed their contracts.

Our experience has been that roughly half of these immigrants quit immediately when their time is served. In spite of this the program has helped very considerably as the shortage in this area, even of inexperienced mine labour, has been acute particularly during the past few summers.

The language problem was not so difficult as anticipated as we were fortunate in having older employees of various European extractions.

Yours very truly,
Malartic Gold Fields, Ltd.
Herbert H. Cox, Manager.

To The Editor

Engineering and Mining Journal:

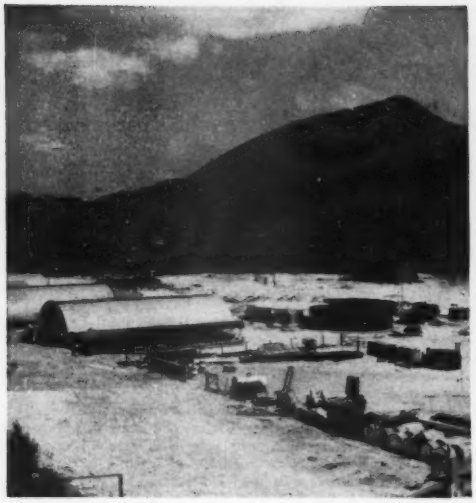
The co-operative immigration scheme of the Canadian Mining Industry has been an unqualified success in the opinion of the gold mines of Kirkland Lake and Larder Lake mining districts of Ontario. It is considered to have been a "life-saver." When the plan to augment the dwindling number of miners was launched 4½ years ago, the anticipated problems of placement were outweighed by the need for men.

The first group of men arrived in Kirkland Lake, December 15, 1947, and by December 31, 1951, 847 had been received under the plan. At the latter date, 494 which constituted 11% of the total working force, were still employed in these mines, the balance having left either on completion of contracts or subsequently. Approximately 15% of all those received have remained over 3 years, 12% from 2-3 years, and 10% from 1-2 years.

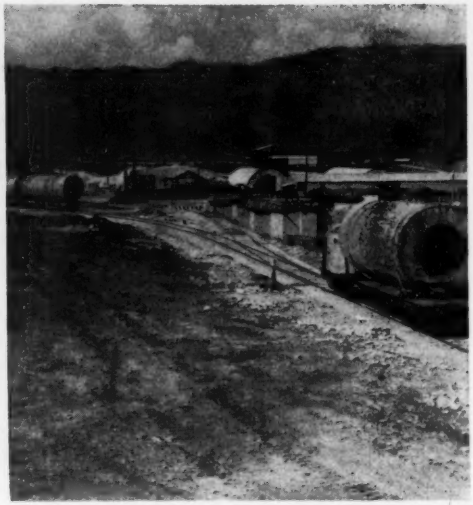
Our experience has shown that married men have remained longer in the employ of the mine than have the single men. The earlier movements of men were made up almost entirely of single men. These left shortly after the end of their contracts of one year to seek work elsewhere in their own trades and professions. Among the immigrants were many tradesmen and professional men who used the mines' immigration scheme simply as a means to come to Canada. They had no intention of staying any longer than was absolutely necessary.

The centralization of the plan in the hands of the Canadian Metal Mining Association, eliminated many of the difficulties which might have confronted the individual operators in bringing the men from overseas. The Association handled the whole scheme most efficiently.

Yours very truly,
Alex. Harris,
Wright-Hargreaves Mines, Ltd.
Kirkland Lake, Ontario



BUILDING MATERIALS and quonset huts mark the start of construction, now well under way.



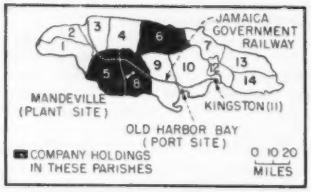
HUGE CALCINE KILNS will treat aluminum hydrate derived from bauxite ores produced in Jamaica.

New Large Alumina Plant

JAMAICA, largest island in the British West Indies, is undergoing a physical change under the impact of the expansion of North America's primary aluminum industry. This Caribbean vacation island is about to become an important supplier of the raw material, bauxite.

Bauxite is the source of aluminum and it is Jamica's most important, but undeveloped, ore. Some of the island's vast deposits, estimated at a total of over 100-million metric tons, will be mined by Jamaica Bauxites, Ltd., the only company planning the production of alumina on the island. The company owns 30,000 acres of high-grade deposits in the parishes of Manchester, St. Ann, and St. Elizabeth. Two American companies also plan to mine bauxite and ship direct to plants in the U.S.A.

Most of the Jamaica alumina will go to the new aluminum smelter in British Columbia, now under construction by the Aluminum Company of Canada, Ltd. Designed to be ultimately the world's largest aluminum smelter and power development, the new west coast Canadian project is expected to be in operation by 1954 in its initial stage. Both the Jamaican and Canadian companies are subsidiaries of Aluminium, Ltd., Montreal.



Key to Jamaica Parishes

1. Westmoreland	8. Manchester
2. Hanover	9. Clarendon
3. St. James	10. St. Catherine
4. Trelawny	11. Kingston
5. St. Elizabeth	12. St. Andrew
6. St. Ann	13. Portland
7. St. Mary	14. St. Thomas

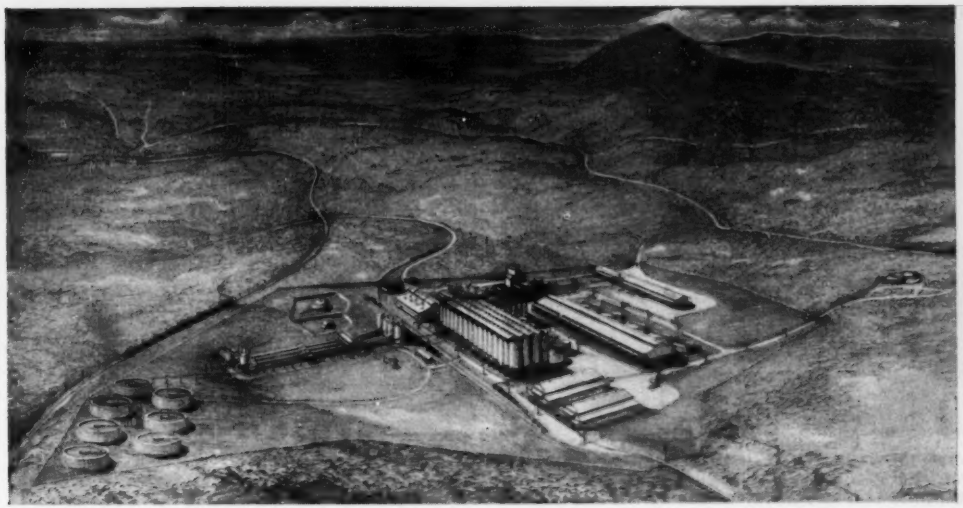
Jamaica Bauxites, Ltd. is now erecting a plant in the parish of Manchester. Initial output will be 100 metric tons of alumina per day, with ultimate enlargement to 1,000 tons, planned in stages over a period of years. Designed capacity has already been enlarged to 450 tons per day and may go higher.

Present market conditions point to a possibility of revising Jamaican plant capacity up to 650 tons per day in the not too distant future. Thus the pace of demand is bringing to fruition the original plans envisaged for Jamaica years sooner than anticipated, and in August 1950 commencement of construction work in the island was announced by Nathanael V. Davis, president of Aluminium, Ltd.

Although the first report on the geology of Jamaica, made in 1869, described the island's red earth as principally a mixture of iron oxides and alumina, the potential importance of the material as the ore of aluminum was not realized at that early date in the history of this light metal.

Discovery of bauxite on the island of Jamaica was not made until 1942, when samples of red ferruginous earth were taken from the property of Sir Alfred H. d'Costa, who had them analyzed by the government's Department of Agriculture. On further analysis by the laboratories of Aluminium, Ltd. in Canada, the company immediately began prospecting on the island and within a short time proved the existence of deposits of economic importance.

In 1942 the Governor of Jamaica, under the Emergency Defense Act, appointed the Canadian company, Aluminium Laboratories, Ltd., as the agent of the government to conduct investigations, and develop and mine the bauxite. It was then intended to supplement production of Guiana bauxite as a war emergency, as the enemy was sinking



WHEN FINISHED, the plant of Jamaica Bauxites, Ltd. will look like this. Initial capacity will be 100 tons of alumina per day. When finally completed, capacity will be increased to 1,000 tons of alumina per day.

Will Treat Jamaica Bauxite

many Guiana bauxite cargoes at this stage of the war. This company, a subsidiary of Aluminium, Ltd., carried on extensive exploration work early in 1943 and shipped a cargo of bauxite for experimental plant tests.

The Jamaican ore, being of comparatively low grade, is not suitable for use in existing Canadian refining plants without a considerable sacrifice of production capacity. It takes 6 tons of Jamaican bauxite to make 1 ton of aluminum, whereas only 4 tons of British Guiana bauxite are required to produce the same amount of aluminum.

The site of the development is near the town of Mandeville. Grading and site preparations have been completed, and foundations are well under way, with some buildings in process of erection. Structural steel and tank plates have arrived from England and concrete has been poured for the footing for several large tanks, some of which have already been erected. However, the hurricane in August caused some delay.

A mile-long railway spur line has been completed between the plant and Williamsfield station on the Jamaica Government Railway. Another 2½ mi. spur line will connect the Government Railway with a company port now being constructed at Old Harbour Bay on the south coast. Old Harbour is 22 mi. west of Kingston and 35 mi. southeast of the alumina plant site. Formerly agricultural, this area will undergo a considerable transformation. Here will be an all-steel pier 600 ft. long and 88 ft. wide, with a 32-ft. depth of water alongside. Extensive storage facilities for alumina will be provided at the port by two steel silos, with a capacity of 10,000 metric tons each. These will be filled by conveyor belts from the railroad cars, and in turn discharged by a 48-in. by 1,400-ft. conveyor to the pier. Facilities will also include storage for 80,000 bbl. of Bunker "C" fuel oil, to be used for firing both the calcining kilns and steam generating plant at the alumina plant. Transit sheds will be provided for soda ash and other raw materials, as well as for alumina in bags.

An innovation in the method of shipping the alumina is planned. The alumina will be discharged into the holds at a rate of 600 tons per hour. Ocean shipment of alumina in bulk has never been attempted before, bagging being the usual method because of the abrasive character and powderiness of the product and the necessity for maintenance of purity. Considerable saving in handling, ship time, and bags is foreseen through the adoption of bulk shipments.

Water supply, always a key factor in the alumina production process, presents a problem in Jamaica. Although the island is a rainy country, having from 60 to 80 in. of average precipitation per year, there are no streams in the bauxite districts. The water seeps readily through the surface soil and bauxite, reaching underground solution channels in the limestone and is quickly carried away as subterranean streams. Therefore Jamaica Bauxites, Ltd. drilled two 825-ft. wells, extending to 300 ft. below sea level. Elevation of the wells is 525 ft., and water will be pumped 4 mi. through a buried 10-in. pipe line to a reservoir on a hill near the plant at an elevation of 1,450 ft.

Open-pit mining operations will be employed, using mechanical excavators, and the bauxite will be transported to the plant by diesel-powered haulage units. Briefly the process for converting the bauxite into alumina consists of dissolving the bauxite in caustic soda solution, separating waste residue, precipitating aluminum hydrate and then calcining it in oil-fired rotary kilns.

Mineralogically the bauxite of

Why Jamaica Bauxites, Ltd., is in the agriculture business.

COOPERATING WITH THE JAMAICAN GOVERNMENT'S aims to retain the island's arable land, Jamaica Bauxites, Ltd., is applying modern agricultural methods to produce citrus fruits like those shown at left. Island food supply for a fast growing population is being augmented by company herds, now totaling 4,000 head.

Jamaica is composed chiefly of cryptocrystalline aluminum trihydrate, hydrated and unhydrated iron oxides and alumina-iron hydrogels. Aluminum monohydrate, possibly in the form of the mineral boehmite, sometimes occurs in appreciable amounts in the red bauxite, but is comparatively rare in the yellow bauxite. The silica is present mainly as disseminated clay minerals, the titania probably as hydrated oxides, and the phosphorus very likely as iron phosphate.

Jamaican bauxite varies in chemical composition both laterally and vertically in the same deposit, and from district to district, but the following range in average composition may be taken as representative of many of the large deposits:

	Percent
Combined water (H_2O)	26.0—27.8
Silica (SiO_2)	0.4— 3.5
Iron oxide (Fe_2O_3)	17.5—22.8
Titania (TiO_2)	2.4— 2.6
Phosphorus pentoxide (P_2O_5)	0.3— 2.8
Calcium oxide (CaO)	0.1— 1.2
Alumina (Al_2O_3)	46.4—50.3

Minor elements, totaling less than 1% as oxides, are magnesium, vanadium, manganese, zirconium and chromium. Jamaican bauxites are of two varieties, yellow and red. The difference in color is attributed to the state of hydration and particle size of the iron; yellow bauxite turns red when heated.

Advantages of the comparatively low silica content of the ore are offset by the general physical properties and the content of iron oxides and some phosphorus. It is believed that the physical state of the iron oxides is largely responsible for the poor filtration and settling characteristics which, together with its low alumina, render Jamaican bauxite a low-grade ore. These particular qualities of Jamaican ore have necessitated many years of research in refining techniques by the Canadian company.

Eight Million To Start

Initial capital expenditure for the plant was set at $8-million, financed partly through an E.C.A. loan to be repaid in aluminum to the United States Government stockpile. Including Jamaica Bauxites, Ltd.'s agricultural operations, this means that the company's investment in the island will be about $12-million. However, actual cost for the most recently expanded construction will be $9.5-million immediately, and may eventually amount to as much as $40-million. Dr. D. A. Bryn Davis, managing director, and a widely experienced geologist, is in charge of operations on the island.

For the past seven years the company has been engaged in both geological work and in agricultural pursuits, in keeping with the desire of the Jamaican Government to retain the island's arable land in production for its rapidly increasing population. The company has built up a herd of nearly 4,000 head of cattle, mainly of the beef type, and has made considerable progress in improving the breed. To achieve a type most suited to the island conditions, the company is breeding from both local and imported European and Indian strains, the principal breeds being Aberdeen Angus, Red Poll, and Brahmins, thus combining hardness with beef-bearing properties. Starting with 890 head in 1944, the beef herd now has been expanded to its present size, with the calf crop increasing the herd considerably each year. Approximately 300,000 lb. of beef were sold to local butchers for sale, or sent to the livestock clearing houses in Kingston during the past year. Milk production from the dairy herd, which comprises approximately 150 head, is sold chiefly to dairies on the island. The most modern methods are employed in this venture, including concrete drinking pools and animal dipping tanks for tick control. As a result of scientific care, feeding, and treatment, the death rate is remarkably low, despite the handicaps of tropical climate.

Jamaica, like other islands in the Caribbean, has the problem of low productivity for its large population. The company has pursued a progressive agricultural policy with its 400 farm employees, applying up-to-date farming principles to increase the yield of the land. It also has 2,200 tenant farmers, with small tenant holdings on the properties, occupying approximately 3,000 acres. Citrus trees laden with oranges and grapefruit show the farmers what they can do if they care for their trees and apply proper techniques to the soil. The company is carrying on a program of reforestation and has already planted 100,000 hardwood timber seedings.

MARKETS—Trends and Prices (*Continued from page 69*)

Lead Production by Countries

Production of refined lead by countries that account for a substantial percentage of the world's total output, as reported by the American Bureau of Metal Statistics. The accounting is essentially on the basis of primary refineries. Figures in short tons.

	Jan.-Dec. 1950	Jan.-Sept. 1951	Oct. 1951	Nov. 1951	Dec. 1951
United States (a)	571,763	379,613	34,273	36,234	36,754
Canada	170,364	121,744	13,544	13,403	13,310
Mexico	270,951	150,485	24,129	22,404	22,334
Argentina (b)	25,400	.....	.....	.....	.....
Peru	34,483	37,392	3,845	3,710	4,097
Belgium (c)	68,446	57,152	6,854	6,322	.....
France	68,779	40,817	4,849	3,261	.....
Fed. Rep. Germany	171,330	126,683	13,154	14,588	.....
Italy	42,780	25,879	3,406	5,944	.....
Spain	38,443	33,804	3,818	3,345	.....
Japan	17,599	14,762	1,095	.....	.....
Australia (d)	216,978	158,167	19,626	18,283	.....
French Morocco	.....	11,942	2,731	2,744	.....
Tunisia	25,945	19,855	2,808	815	.....
Rhodesia	15,355	11,872	1,344	1,288	1,142
Totals	1,713,216	1,190,167	135,476	.....	.....

(a) Includes derivation from imported ore and base bullion. (b) Production for 1950 not included in total; 1951 not available. (c) Reported as three-months' moving averages. (d) Includes lead refined in England from Australian base bullion.

Official London Prices

Consumers in the United Kingdom obtain copper, lead and zinc at prices named by the British Ministry of Metals. Delivered prices in effect as February ended were as follows:

	Per Long Ton £	s.	d.
COPPER:			
Electrolytic, high conductivity	227	0	0
Fire refined, high conductivity	227	0	0
Fire refined, high grade	226	10	0
Fire refined, min. 99.7 percent	226	0	0
Fire refined, min. 99.2 percent	225	10	0
LEAD:			
Soft, foreign duty paid	170	0	0
Soft, Empire	170	0	0
English, refined	171	10	0
ZINC:			
Foreign (G.o.b.) duty paid	190	0	0
Domestic (G.o.b.) duty paid	190	0	0
Prime Western and debased	190	0	0
Refined and electrolytic	194	0	0
Minimum 99.99 percent	196	0	0

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

February 29, 1952

Aluminum, ingot, 99 plus percent, lb. (base price)	19c.
Antimony, spot, lb., 5 tons and up but less than carload, in cases	$3.35c.
Bismuth, ton lots, lb.	$2.25
Cadmium, commercial sticks, delivered, lb.	$2.55
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	$2.40
Indium, troy oz.	$2.25
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	56½c.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	24½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz.	$90.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$202 @ $205
Selenium, 99.5 percent, lb.	$3.00 @ $3.50
Silicon, minimum 97 percent, carloads, lb.	20c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$21.50
Titanium, 96 to 98 percent, lb.	$5.00

(a) Includes U. S. duty.

METALLIC ORES

Berryllium Ore, imported, 10 to 20% BeO, per unit	$36.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
44% Cr_2O_3 no ratio	$27.00 @ $28.00
48% Cr_2O_3, 3 to 1 ratio	$43.00 @ $55.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$8.70
Mesabi bessemer	$8.45
Mesabi, non-bessemer	$8.30
Lead (Galena), 80 percent, Joplin, Mo., ton	(b) $245.95
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties, $1.20 @ $1.25, c.i.f. U. S. ports, duty extra. Long-term contract nominal at 90c. to 95c., c.i.f., duty extra.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	60c.
Tantalite, 60% concentrate, per lb.	$2.00 @ $2.25
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, U. S., equivalent, duty extra	(a) $60.00
Domestic, scheelite, 60 percent f.o.b. mine	$65.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	31c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	

(a) F.o.b. port of shipment. (b) Revised.

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	6½c.
Cobalt Oxide, 72½ to 73½%, ceramic grade, per lb.	$1.82 @ $1.84½
Copper Sulphate, 100 lb.	$8.95 @ $9.95

ALLOYS

Beryllium Copper, 4 percent Be. per lb. of alloy, 5 lb. ingot	$1.56
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	21¾c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$185.00
Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained	$1.32
Ferrosilicon, 50 percent, per lb. of contained Si	12.4c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$5.00
Ferrovanadium, per lb. of V delivered	$3.00 @ $3.25
Silicomanganese, Max. 1½ percent carbon, per lb. contracts	9.9c.
Spiegeleisen, per long ton, 19 @ 21 percent grade	$75.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$960 @ $1,500
Crude No. 2	$595 @ $960
Spinning fibers	$275 @ $475
Shingle fibers	$123 @ $170
Paper stock	$85 @ $119
Waste	$63 @ $70
Shorts	$30 @ $63
Asbestos, Vermont, f.o.b. Hyde Park:	
Spinning fibers	$279.50 @ $302.00
Shingle stock	$135.00 @ $162.00
Paper stock	$81.50 @ $115.00
Waste, stucco or plaster	$71.40
Refuse or shorts	$34.00 @ $63.00
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$13.00 @ $13.50
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$10.15 @ $10.40
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	(a) $4.50 @ $5.50
Domestic, chemical, 55 to 58 percent	(a) $8.50 @ $9.50
Domestic, abrasive, 80 to 84 percent	(a) $18.00 @ $18.50
China Clay, f.o.b. mines, ton:	
Georgia, filler and ceramic grades	$8.50 @ $9.50
North Carolina ceramic grade	$20.25 @ $22.25
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50 @ $22.25
Glass feldspar, white, 20 mesh	$11.75 @ $12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70% effective, CaF_2, ton	$43.00
Acid 97% concentrate, bulk, ton	$60.00 @ $65.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00 @ $14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$36.30
Mica—Domestic, f.o.b. mines. Punch 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 80 to 85c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.40 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton. Scrap, $32 and up.	
Ocher, Georgia, ton, in sacks	$26.25
Pyrites, Spanish, per long ton unit of S, c.l.f. Atlantic ports	No quoted
Sulphur, Texas, mines, long ton	$22.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50 @ $20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$35.00

(a) Nominal.

IRON AND STEEL

Pig iron, gross ton, basic, Valley furnaces	$52.00
Steel, f.o.b., Pittsburgh billets, net ton	$56.00
Structural shapes, 100 lb.	$3.65

KEEPING TAB ON PRACTICE

MARION'S 191-M SHOVEL, "biggest on two crawlers," is electric-driven or diesel-electric-driven and has a 10-cu. yd. bucket. It can load Euclid's new test-model 50-ton truck, alongside, in four passes.

BUCYRUS-ERIE'S 1250-B WALKING DRAGLINE swings a 30-cu. yd. bucket on 200-ft. boom, heading this builder's line of large walking drags. It cycles as fast as its 1150-B predecessor, has greater range and capacity.

Trend to Bigger Equipment Marks Open Pit Practice

IN LARGE-SCALE SURFACE MINING the trend to bigger equipment continues, with attention shown to details in design and maintenance that will increase operating life and availability. (See also *E&MJ, July*, 1951, pages 94-101).

Bigger Holes for Breaking

Nine-Inch Holes for Drilling. No novelty, holes of this size are still gaining in favor, drilled with tool strings weighing about 610 lb. per inch of cutting edge.

Various improvements are noted in connection with churn-drilling practice: An Iron Country operator has started to use an electric induction furnace for heating bits to forging temperature. This makes it possible to control the rate of heating. In the West, a large copper company is installing hydraulic leveling devices (introduced a few years ago) on its 42-T Bucyrus-Erie machines to speed up the overall footages.

Rotary air-blast drilling with Joy's Champion drill is giving good footages in various places in limestone, dolomite and gypsum (*E&MJ*, Aug. 1951, pp. 74-75). Winter-Weiss Co., Denver, also has a dry rotary drill using a roller-cone bit (4-6-in.), with which they think they can go 350 ft. Dry drilling with wagon drills is to be used at several places on the Colorado Plateau. The cuttings will be collected with the exhaust.

For shooting boulders, LeRoi's self-powered portable Tractair Mobildrill, combining compressor and boom-mounted (dry) rock drill, is proving a convenience to certain operators. It uses tungsten-carbide bits.

The Buda auger drill is in service in several places in the Iron Country and greater use is anticipated. It is mounted on a truck chassis.

The number of Quarrymaster drills in service is increasing. This machine has been improved, and has a larger piston, longer stroke and twice its former compressor capacity. Its speed in drilling 6-in. holes permits more holes to be drilled in a better pattern for blasting.

Wider use is being made of the McCarthy auger drill in the metal mining field. Reynolds Aluminum, Arkansas, has purchased two of the vertical type for drilling overburden, and 12 horizontal self-propelled machines have been sold for use in the Iron Country. Other units are going to iron ore areas in Venezuela, Labrador and Africa.

Jet-Piercing Progresses. The Linde Air Products Co.'s JPM-3 machine, nearing completion for Reserve Mining Co., is to be delivered soon. It is expected to be able to pierce holes of minimum 7½-in. diameter to 45-ft. depth automatically or by manual control.

Because of the irregularities of the walls of holes made by jet-piercing, a supplementary blasting agent which is waterproof, free-flowing, and of high density, has been developed. When this material was merely poured into the hole as the conventional cartridges were being lowered, over 40 tons of rock per ft. of hole was obtained from a 30-ft. 6½-in. hole, in contrast to 24.5 tons per ft. when the hole was loaded in the conventional way. This gain, it is said, was made for only a 3% increase in explosives cost.

Design and manufacture of jet-piercing burners are being investigated with the object of producing a blowpipe that will make the most hole for least cost (long life and minimum upkeep). Work continues with the manual blowpipe. It appears that a recent offspring of the original 16-lb. blockholer may be useful for toeholing or other bank or face work.

Still Bigger Draglines

With respect to excavators, the trend to bigger units is illustrated by the introduction of three new models, including two draglines and a shovel:

Swinging a 30-cu. yd. bucket on a 200-ft. boom or a 23-cu. yd. bucket on a 235-ft. boom, Bucyrus-Erie's 1250-B

This article is the continuation of the Survey of Mining Practice, in *E&MJ*, Feb., 1952.

walking dragline replaces the 1150-B machine at the head of this builder's line of large walking drags. (The latter model is the one used by M. A. Hanna in stripping the South Agnew and Morton properties on the Mesabi; and at International Minerals and Chemical Corp.'s Peace Valley phosphate mine in Florida.) The 1250-B is said to cycle as fast as its predecessor and to have greater range and capacity. Its A-frame and mast are larger, the tub and shoes bigger, its gearing and shafting heavier, and the hoist face is wider. With an additional swing power unit, it has greater range and capacity than its predecessor.

Other new Bucyrus excavators, namely, the 150-B and the 190-B, represent improvements over Models 120-B and 170-B respectively. They have features new to machines of this size but which have been proved on the larger strippers. The shovels are larger with 6 and 8-cu. yd. dippers and have a new front-end design which includes a two-part hinged boom, a tubular dipper handle and double-twin hoist. The crowd machinery is on the forward end of the revolving frame instead of on the boom, in this way reducing front-end weight, increasing cycle speed and payload capacity.

From England has come word of a big new walking dragline of a capacity-reach of 20 cu. yd. at 260-ft. radius and built by Ransomes and Rapier for Stewarts and Lloyds, to strip 100 ft. of overburden in one of the latter's ironstone quarries. The operators call it the world's biggest. (See *E&MJ*, Dec., 1951, pp. 100-101.) Digging capacity is 1600 tph. A tubular boom 282 ft. long features the design of this machine.

Big New Mining Shovel. What Marion Power Shovel Co. calls the world's largest shovel on two crawlers is that company's new electric, or diesel-electric 191-M shovel. Dipper capacity is 10 cu. yd. The cycle time, clocked at 22 sec., permits almost three cycles per minute. This means that a 50-ton truck, which is now beginning to appear in mining work in test models, could be loaded in one minute. Despite the machine's size, its cycle is said to be comparable to that of Marion's smaller, fast 151-M shovel. Other features are travel speed and maneuverability.

To increase its working range as a stripper, the Koehring Co. has taken its basic 2½-cu. yd. excavator, increased its boom length from 26 to 50 ft., replaced the 19½-ft. double dipper stick with a 36-ft. single stick and increased the maximum dumping height from 34 to 65 ft. and the maximum digging radius from 39 ft. 1 in. to 67 ft.

Instances of the growing use of bigger excavators on a given job are many. A Mesabi operator is buying shovels with capacities up to 8-9 cu. yd., in contrast to the 5-cu. yd. bucket commonly used, the object being to cut the time required for loading 30-34-ton trucks and to increase the cubic yards per man-hour. A Florida phosphate company (the Virginia-Carolina Chemical Corp.) has added another Bucyrus 650-B dragline with a 17½-cu. yd. bucket to the unit of like capacity already in service, the two being in contrast to the company's older 8 and 9-cu. yd. machines. In the same area, the Davison Chemical Corporation has also installed a 650-B machine, this one swinging a 14-cu. yd. bucket. These draglines are all used for both stripping and mining.

Equipping a New Pit. The current trend is to be noted in the equipment provided for a new pit by a southwestern copper company:

2 Marion 4161 shovels, 5½-cu. yd. dipper.

1 P. & H. 1600 shovel, 6-cu. yd. dipper.

1 P. & H. 955-A (diesel-powered) shovel, 2½-cu yd. dioper.

3 Bucyrus-Erie 29T churn drills (2 electric and 1 diesel) with hydraulic jacks and 9-in. tools.

15 Euclid FFD 34-ton trucks with twin 200-hp. Cummins engines and Allison torque converters.

Miscellaneous additional equipment on this job includes a Caterpillar No. 12 motor grader, a DW10 bulldozer and a 15-cu. yd. LeTourneau Carry-All; also a grease truck, two portable compressors (one 500-cfm electric and one 210 cfm diesel), three D8 angledozers, a Wagner Scoopmobile and a 20-ton P. & H. truck crane.

Restoring the Surface

Making Use of Mined-Out Land. This problem is receiving attention in various areas where surface mining is done. Another Florida phosphate company, the Davison Chemical Corp., is studying it and now has a full-time supervisor whose task is to discover how best to use the company's mined-out lands. Among his duties will be the planting of trees and grass on spoil banks.

Digging, Carrying, Hauling

The Scraper's Functions

The Scraper's Three-Fold Use. Increasing use of scrapers, trucks, and belt conveyors is making it possible to move tonnages that otherwise would be hard to move economically.

Greater use of the self-propelled, rubber-tired wheel scraper is indicated. LaPlante Choate Mfg. Co. holds that, since this type of unit was introduced 11 years ago, much progress has been made in providing a unit that is as efficient as the track-type tractor. The days are gone when rubber-tired equipment is considered usable only on long-haul jobs.

Activity in producing tractor-powered equipment and accessories is marked in the case of Caterpillar Tractor Co. The following items released during the year indicate that its thoughts are directed toward bigger hauling units and heavy-duty work tools.

1. Model DW20, four-wheel, pneumatic-tired tractor, powered by a diesel engine of 275 hp. at 2000 rpm. The "work tools" for this include: The Model W20 bottom-dump, two-wheel trailer, capacity 17 cu. yd. struck, 25 cu. yd. heaped. Also the Model 20 scraper, 15 cu. yd. struck, 20 cu. yd. heaped. By adding sideboards capacity may be increased to 18 cu. yd. struck (23 heaped). Maximum carrying load is 25 tons. Also a Model 20S bulldozer attachment.

2. Model DW21, two-wheel, pneumatic-tired, prime mover, powered with a 275-hp. diesel engine, and Model 21 scraper, 15 cu. yd. struck capacity (20 heaped). With sideboards, the capacity may be increased to 18 cu. yd. struck and 23 heaped.

3. Model 15 scraper for use with DW10 four-wheel, pneumatic-tired tractor, with capacity of 10 cu. yd. struck and 13 heaped. With sideboards capacity may be raised to 12 cu. yd. struck (15 heaped).

4. Model 10S bulldozer attachment for the DW10 wheel tractor.

5. Model 90 flat-bottom scraper for use behind D8 track-laying tractor, capacity 21.2 cu. yd. struck (27 heaped). With 15-in. sideboards, capacity may be raised to 25.5 cu. yd. struck (and 31 heaped). Maximum carrying capacity is 35 tons.

6. Model 8SR bulldozer attachment for D8 track-laying tractor, designed for rough work in rock, shale and other hard materials.

7. Models D337 and D326 diesel engines, rated at 180 hp. and 125 hp. respectively, at 1600 rpm. These engines can be used to power auxiliary generating sets, air compressors, ventilating fans, pumps and crushing and milling equipment.

Increasing use of front-end loaders has resulted in a greater demand for crawler track-type tractors by the manufacturers of such equipment.

Trucks Increasingly Important

Now the 50-Ton Test Unit. The trend to larger capacities and engine-horsepower in the heavy-duty, off-highway truck field has been emphasized more than once, particularly in *E.&M.J.*, July, 1951, pp. 102-103. The 30-34-ton torque-converter equipped unit is rapidly becoming well established, and manufacturers and users are looking ahead to larger sizes. Two 50-ton trucks carrying the load on the back have been undergoing field tests for some time. Euclid's LLD rear-dump unit of this capacity is being tried out in the Iron Country and the Pennsylvania anthracite field. A western contractor has purchased 10 of this model, though it is not in production. This unit has two engines totaling 600 hp., each with a torque converter and a hydraulic transmission. With 100,000 lb. payload capacity, the truck develops 31.6 mph with maximum

speed loaded. The body is 22 ft. 6 in. long, and 11 ft. 11 in. high at the rear. Overall length is 36 ft. 5 in. by 13 ft. 9 in. The truck is equipped for hydraulic booster steering All its tires are 18:00 x 33.

According to R. W. Whitney, manager of M. A. Hanna Co.'s Minnesota iron mines, at the Los Angeles meeting of the Mining Congress, about 66% of the ore and 80% of the waste removed from the open-pit properties on the Mesabi Range in 1951 was handled by trucks.

In line with the trend, one of the larger operators in the Iron Country is replacing 20-22-ton trucks with 30-34-ton units equipped with converters and compressed-air starters. The converters have made truck operation simpler and reduced breakdowns. The new starters cut battery costs and are more positive in operation. The larger trucks have increased output per man.

Body Type Is Varying. While most Iron Country trucks are of the rear-dump type, the tractor-trailer unit with a side-dumping body has seen service for years with certain users and is not out of the future picture. The bottom-dump truck also is thought to have promise. A tractor-trailer unit of this type has been under test. Payload capacity is 66,000 lb., the engine a 300-hp. unit.

Noted among new transport units is a line of gooseneck trailers with lift-door bodies, made by Easton to be used with Caterpillar tractors. Easton has an order for the first of the Caterpillar-Easton units to use hydraulic dumping with a side-dump drop-door body on the same gooseneck trailer frame. Athey Products Corp. has introduced a 30-ton wagon for use with Caterpillar's DW 20 rubber-tired tractor. It is dumped to either side by hydraulic means. LeTourneau has been building its "Super C" Tournadozer which is said to be available with a torque converter and electric control.

Manganese Steel in Truck Bottom. Last year Kaiser Steel Corp. fitted the bottom of its Euclid FD truck with a set of 1⅛-in. cast manganese-steel plates. The set work-hardened before the plates had lost ⅛ in. in thickness, according to K. B. Powell. As a result, seven 15-cu. yd. TD Euclids are being equipped with cast manganese body liners.

The exhaust-heated body is being supplied with most off-highway trucks today.

The need for better haul roads by heavy-duty trucks is well appreciated. As trucks and loads get bigger, such roads are being provided. Bulldozers are likewise getting bigger, heavier, with correspondingly bigger horsepowers, and in cases equipped with the torque converter also.

Increasing Engine Size—Bigger engines are required for bigger trucks. Motors of 125 to 286 hp. are being used by one manufacturer and, for twin-engine models in various body types by the same maker, the horsepower totals 380 to 480. Some 34-ton rear-dump models have been equipped with a 400-hp. engine. The 50-ton test unit with two 300-hp. units has already been mentioned.

Engines used for truck transport and shovels include two heavy-duty diesel units, made by Waukesha, the Model 6-WAKD for heavy-duty units and shovels, and Model 6-NKD for shovels and cranes.

Torque Converter's Importance—Application of the torque converter to heavy-duty trucks is currently the outstanding development in this field. See *E&MJ*, July, 1951, pp. 102-103, and Aug., 1951, pp. 68-72. Several different makes are in use. The converter is becoming standard equipment for the 30-34-ton size. Most of the trucks of this size delivered have one. Advantages reported include: Less maintenance; need for less skill on driver's part; less driver fatigue; increased tonnage per truck and ability to use a smaller engine in a truck of given size than otherwise necessary.

Spring mounting of trucks is giving faster, easier, safer travel, cutting turnover and maintenance.

Truck life up to 20,000 hours is being obtained and engine life of 5000-6000 hours up to the point of rebuilding.

Rail Haulage Still a Factor

Rack-Rail Haulage Serves Open Pit. The Eisenerz iron mine in Austria is serviced by a railroad (at 2500-5000 ft. elevation) having in its profile a series of seven racks with 10% maximum grade connected by rail sections having 2.8% maximum grade. For this road General Electric recently delivered two 28-ton electric rack-rail mine locomotives, part of an order for 13.

The running gear is a two-axle type with one 550 v. GHM-850 traction motor driving each axle. The rack gear is mounted on a different level from the locomotive wheels and meshes with the rack at the foot of each steep incline. Increased power and traction are achieved through a pinion and double-reduction gear quill mounted on each driving axle and synchronized with the wheels.

Each locomotive operates as a separate unit, hauling empty cars upgrade and returning with a 60-ton load. Braking speed is 7 mph on rack and 15 mph on rail.

Traction power is collected by two spring-raised, rope-lowered pantographs. Control is electro-pneumatic, providing progressive series-parallel motoring operation and parallel motor dynamic braking.

Use of Diesel Haulage Grown. An Iron Country operator, who has been a user of diesel-electric locomotives on a steadily increasing scale in its open pits now has in operation several 1600-hp. *double-unit* diesel-electric locomotives.

A Florida phosphate company has recently replaced two 50-ton diesel-electric locomotives with one 100-ton unit.

The torque-converter drive is being used by Davenport-Besler Corp. in a new series of diesel locomotives that embraces a range of sizes and gages to meet individual operating conditions. As with trucks, easier and more efficient operation should result.

Advantages of having a properly scheduled maintenance program for maintenance work on diesel-electric locomotives are apparent at Kennecott's Ruth pit in Nevada. Availability is put at 94% as a result (*E&MJ*, Oct., 1951, pp. 88-9). There are 13 locomotives including seven 125-ton units having a 1500-hp. turbo-supercharged V-12 diesel engine and six 70-ton units equipped with a 600-hp. turbo-charged engine. One locomotive was overhauled after 8,237 working hours.

Conveyors Have Big Field

Belt Installations Increase. The growing number of installations of belt conveyors on surface or underground was noted in *E.&M.J.*, July, 1951, pp. 105-107. At the same time, attention was directed to the increasing use in belt construction of high-tensile strength materials, such as cords of cotton, rayon and steel and fabrics containing specially-treated long-staple cotton. Thanks to this, the prospective life of some belts that have been installed is considerably greater than it would otherwise have been. The Mesabi's most recent installation is the belt system used for bringing the ore out of the Danube pit, a vertical lift of 212 ft. Of 1076 ft. length and sloping a maximum of 12 deg. 42 min., this consists of a continuous high-tension steel-cord belt, 30 in. wide, delivering 900 tph. at 600 fpm. A 300-hp. motor drives it.

At the open pit of a New York State operator, two 38-in. belts each 375 ft. long were replaced with one 700-ft. wire-cord belt 48 in. wide.

The Twisted Return Run. This development, exemplified in the stockpiling belt at Mather "B" shaft operated by Cleveland-Cliffs Iron Co. at Negaunee, Mich. (see *E&MJ*, Dec., 1951, pp. 85-86), is worthy of attention. It is said to be the work of B. F. Goodrich and Chain Belt Co. jointly. The belt is 36 in. wide and of U. S. Rubber (Matchless) make.

The belt is twisted 180 deg. after it leaves the take-up behind the head pulley and is again twisted 180 deg. before it reaches the tail pulley. This is to prevent trouble from build-up of wet frozen material on the return idlers during low temperatures in winter. As the belt emerges from the vertical gravity take-up behind the head pulley, it is twisted 180 deg. so that its dirty, carrying surface is face up and the clean, pulley side of the belt runs in contact with the re-

turn idlers. At the tail end the belt is unwound 180 deg. so that the dirty side is again face up as it passes under the loading chute to pick up an additional load. The conveyor is 655 ft. long and the belt is driven by a 60-hp. motor.

Advantages are:

1. Wet sticky materials can be handled readily in freezing weather.
2. Increased return-idler life.
3. Simplification of housekeeping, as clean-up is necessary only at ends of conveyor underneath the twists.
4. No build-up of material on return idlers.
5. Increased cover life for carrying side belt cover.

This installation is said to be operating satisfactorily. Once the belt was trained initially, little additional adjustment of equipment was necessary to keep the belt aligned. It takes a distance of approximately 12 times the belt width to negotiate the belt twist at either end; the use of this ratio eliminates excessive strains and stresses in the belt during twist.

To Splice a Steel-Cable Belt. A new method of splicing steel cable conveyor belting, developed by B. F. Goodrich, places all cables under equal tension during vulcanization so that each carries its share of the load in the finished splice. The method also permits the straightest possible splice, resulting, it is claimed, in belts that track straight and true. Laboratory stress-strain tests prove that the splice is as strong as any other part.

To make the splice, cable ends are cut in staggered pattern. Small tubular connectors are placed over the butted ends. Connectors are first given a light crimping. The partially made splice is stressed to even cable lengths, and connectors are crimped again to lock them to the cables. Rubber and fabric removed for the splice is then rebuilt around the cables. The splice is cured under tension with a conventional vulcanizer.

This tensioned splice can be made in the field. A crimping device is needed for squeezing the connectors to anchor the cable ends, and a special scraping tool to remove rubber from the cables.

Radio Now Well Accepted for Open Pit Communication

The already wide adoption of radio in open-pit work for quick communication between supervisors, shovel men and other key operators, including maintenance men, bears witness to the mining industry's readiness to seize upon anything new that will raise efficiency and cut costs. Radio was unknown in open pit work scarcely more than two years ago. Its present status is indicated by the following notes:

Kennecott Copper's Utah Division has a mobile radio system comprising five base stations working nine mobile units. Each of the latter is equipped with a radio transmitter and receiver. Equipment at a base station is similar in operation. Instant two-way communication has worked to the company's great advantage.

At Kennecott's Ray Mines, Arizona, all trucks of pit foremen and most department heads are equipped with two-way radio.

Kennecott's Nevada Division has not yet adopted radio, having an adequate phone system. However, it is considering radio, inasmuch as its operations, actual and contemplated, are becoming spread out, with some of them isolated.

The Morenci pit of Phelps Dodge, in Arizona, has an installation that is expanding. On record to date is the provision of a remotely controlled central station, two handie-talkie units, 2 locomotive units, 15 mobile units in trucks and cars, and a unit in the radio repair shop (ME, July, 1951, p. 582).

In Consolidated Coppermines' Morris pit, Kimberly, Nev., the operating contractor (Isbell Construction Co.) has the following two-way installation:

The base station is rated at 60 watts, and can reach out about 10 mi. At present, they have four pickups and two pleasure cars equipped with receiving and transmitting facilities. Each of these installations has 10 watts rating. This equipment also serves a second operation of the Isbell company at a point 5 mi. southeast of their base station in Kimberly. The installation has proved very satisfactory.

Oliver Iron Mining Co. is using GE two-way f-m radio in its Sherman pit in the Hibbing-Chisholm district, Minnesota.

Inter-State Iron Co., on the Mesabi, has battery-charged radios at each of its mines to receive Civil Defense broadcast instructions in case of emergency.

Chile Exploration Co., at its Chuquicamata mine, has found very-high-frequency two-way radio advantageous in dispatching ore trains (*E&MJ*, May, 1951, pp. 90-91). A territory 6 mi. in radius is covered.

Cleveland-Cliffs Iron Co. is weighing the advantages of setting up radio communication in its open pits.

At Jones & Laughlin's Benson Mines, New York, the management is contemplating the future adoption of radio.

Bradley Mining Co., Idaho, is using its radio facilities not only between Stibnite and its Boise base but also between either point and mobile aircraft units flying between these points. Such communication is limited to times when the telephone is inoperative, as happens frequently in winter, or in emergencies.

Telephone Sufficient for Some

Northwest Magnesite Co., Chewelah, Wash., operating an open pit, is using the ordinary telephone metallic circuit with amplifier horns to accent the code rings. The system is 14 mi. long. Within its reduction plant and its concentrator and mine office the company uses Teletalk.

Rapid Progress Underground

Use of the Femco Trolleyphone in connection with underground haulage is spreading rapidly. The largest ore mining company in Birmingham now has Trolleyphones in its No. 6 and No. 7 ore mines in addition to those at No. 11. The company has been installing 10 units on four slopes of the ore mines, to provide communication from hoistman to man-trip cars. The unit used on the man-trip car can be taken off and put on the skip for working on the slope. Another operator in the district is also installing Cagephones to talk from both cages to the hoistman at the shaft.

Cleveland-Cliffs Iron Co. has Trolleyphones in its Cliff Shaft mine, and Cagephones in its Mather "B" shaft. Combined Metals Reduction Co. has a Cagephone installation in its Pioche shaft.

A company at Mineville, New York, has two slopes and one shaft equipped with communication. Richard Ore Co., Wharton, N. J., has seven Trolleyphones in its mine; the Warren Foundry & Pipe Corp., at Mt. Hope, N. J., has four.

Universal Exploration Co., at Jefferson City, Tenn., is now in the process of installing communication in its zinc mine. This installation is unique in that there are 12 microphone speaker locations on an audio system that covers the shop, shaft bottom of two shafts, and the top and bottom of four 600-ft. inclines. This audio system will talk in common with two diesel locomotives and two Mancha trammers.

To permit re-establishing communication quickly, in case equipment failure interrupts it, the Trolleyphone's f-m carrier circuit has been packaged in components that can be plugged in. The newly designed unit weighs 50 lb., or 30 lb. less than before.

Johns-Manville at its diatomite mine at Lompoc, Calif., uses the Trolleyphone for its underground haulage. As yet the company has not used radio at its mine on surface.

An Iron Country operator, not heretofore noted, is using radio communication in its haulage underground.

In Nova Scotia, the Dominion Steel & Coal Co. has in service the Mine Phone, an inductive train communication system made by Union Switch & Signal Co.

Trend Upward

For surface and underground work alike, efficient communication is a growing factor in the successful handling of heavy mobile equipment, as stated recently by V. S. Anderson, of Motorola, Inc. The Federal Communications Commission has assigned more radio-frequency bands to this purpose, in recognition of this trend.

Please turn to page 102

Coring Possible in Dry-Drilling of Diamond-Drill Blast Holes in Diamond-Bearing Blue Ground

QUESTION WAS RAISED recently as to whether a core can be taken with the method of *dry* diamond-drilling of blast holes employed by DeBeers Consolidated Mines in its diamondiferous blue ground at Kimberly (described in *E&MJ*, Nov., 1951, pp. 90), where water cannot be used because of the way it would cause the blue ground to swell. The thought behind the question was that, if coring is possible, the method might be useful in exploration drilling in many areas where water is scarce or lacking.

Mr. H. H. Taylor, general manager for DeBeers, answers our question as follows:

"The drilling is essentially done for blast-hole purposes. No core is required, and our normal practice is not to take a core.

"We have, however, conducted coring drilling for experimental purposes, our objective being cheaper drilling, either from faster penetration speeds or lower crown costs.

"In these experiments we did establish that coring was a practical proposition in dry drilling, but as the technique was of no economic advantage, the matter was dropped.

"We may mention that as we did not require the core itself, we did not drill with a core barrel, thus obviating time wasted in pulling rods, although this could undoubtedly be done satisfactorily. Similarly, a high core recovery was not an objective.

"The technique used was to employ special rods with a large internal diameter and flush joints. Thus the core chippings from the crown dropped down through the rods to be ejected or collected at the bottom end of the drill. It may be of interest to mention that in some of these tests the direction of the sludging air was reversed, and found to be of assistance in clearing the core cuttings from the crown. All dust created by the drilling was also collected, as is our standard practice.

"The crowns used in these tests were either wholestone diamond crowns, or tungsten-carbide inserts diamond-impregnated."

Lifter Bars in High-Speed Grinding Mill Stop Slippage and Boost Capacity

THE BIG 11½ x 12-ft. rod mill at Consolidated Mining & Smelting Co.'s Sullivan concentrator has just completed handling its first 5-million tons of feed, according to H. R. Banks. The normal tonnage rate has been about 8,000 per day. Speed has been varied from 13.5 to 19 rpm with a very definite increment in capacity as the speed has risen. Feed is 1½-in.; discharge is about 90% minus 6 mesh.

At about 4-million tons the first set of lifter bars was changed. The wear amounted to 0.00793 lb. of lifter bar per ton of feed.

An estimate of the life of liners and lifter bars is 0.0168 lb. per ton. Rod consumption has been 0.35 lb. per ton of feed.

Mr. Banks says: "It would seem that the original concept of a high-speed rod mill with prominent lifter bars to circumvent any tendency for slippage has been borne out in the experiences to date.

"The size of feed is definitely a function of the rod mill capacity but by speeding up the mill, it has been found possible to handle all requirements in the Sullivan flow."

McIntyre Employs Three Drilling Means

AS STATED IN *E&MJ's* February summary, 75% of the total drilling done by McIntyre Porcupine Mines, Ltd., Ontario, is done with single-use detachable bits, 14% with carbide-insert detachable bits, and 11% with carbide-tipped forged steel. Details follow:

Single-Use Bit. This is the Liddicoat Type 2L bit, 1 in. in size. It is used with 1-in. quarter-octagon, high-carbon steel rods. Some test work has been done with ⅞-in. single-pass bits and ⅞-in. quarter-octagon high-carbon steel rods in development headings and raises. Results indicate a slightly lower footage for the ⅞-in. bits and a decidedly lower footage for the ⅞-in. rods.

The Carbide-Insert Detachable Bit. Carset 1⅜-in. bits with Type "O" thread and ⅞-in. quarter-octagon, high-carbon steel rods are used for 14% of the total, as stated. This drilling is done by nine 3-in. power-feed leyner-type machines in development headings on the lower levels where the ground is quite hard and it is not possible to get one round each shift with steel bits. Some trouble has been had with the bit and shank threads becoming worn and subsequently stripping. The rod footage is good, being at least 100 ft. per rod higher than when steel bits are used; however, overall drilling costs are about 3¢ a foot higher. This is hardly a fair comparison because the hardness of the rock differs on the upper and on the lower levels.

The Carbide-Tipped Forged Steel. Coromant-type, carbide-tipped forged steel is being used with airleg drills and accounts for the 11% of the drilling mentioned. Eighteen machines (15 in stopes, three in development headings) are using this steel which is sharpened in working places by the miners themselves. The Series 1 steel (1⅛-in. gage starter) is used except for drilling cut holes in development headings where the Series 4 steel (1½-in. gage starter) is used. One-inch powder is used with this steel. Cost of drilling with the carbide-tipped steel is approximately 2¢ a foot higher than with Liddicoat steel bits. However, the flexibility of the equipment more than compensates for the difference. Experience to date indicates that the lighter equipment will replace the leyners in stopes.

Less Stringent Controls Work at Sullivan Sink-Float Plant

OPERATION WITH LESS stringent controls than had been thought necessary has been found possible at Sullivan's sink-float plant, H. R. Banks states. This has permitted such changes as going from double to single-deck screening for the preparation screens. This is peculiar to the Sullivan.

"The Sink and Float process with ease of control through medium changes," says Mr. Banks, "offers an excellent tool for concentration where a sufficient margin exists between concentrates and tailing and where the values are segregated in ore particles down to, say, 10-mesh."

Practice Shorts

A New Shaped Charge. For all types of secondary blasting required in quarrying and open pit metal mining where boulders from primary shots must be broken before they can be loaded, a shaped charge known as the Plurajet is being offered by Shaped Charge Explosive Manufacturers, Inc., Box 900, Martinsburg, W. Va. To justify the name, the makers claim that ways and means, now patented, have been found to divide the otherwise concentrated stream of force into a series of jets that effectively break the fragment or boulder into pieces which are not thrown through the air. The charges are supplied in five different sizes.

To Check Corrosion. Knob Hill Mines, Washington, initiated the practice some months ago of spraying 3M Autobody Underseal on units exposed to highly corrosive mine water. The possibility of extending this practice to all air and water lines and the base of track rails was being considered.

One More Diesel Locomotive in Service. For driving the 23-mi. Blue River diversion tunnel, the Denver Water Board has purchased a 5-ton Ruth diesel locomotive equipped with an exhaust gas conditioner having a 6.75 Venturi and a 2.25 jet. According to the manufacturer, the overall results are superior to those that have been obtained with the 7½-ton battery locomotive in use hitherto.

Triumph Mining Co's. Efficient New Mill

MODERN DESIGN and construction are producing good results at the new mill of Triumph Mining Co. near Hailey, Idaho. This point was made in the description of the mine and mill that appeared on p. 99 of the January, 1952, *E&MJ*, but the flowsheet and supporting metallurgical data were inadvertently omitted. In response to requests from many readers who noted the omission, we are presenting these data on this page.

The Triumph mill, which is a fine example of design for economy of labor in operation, is the work of Western-Knapp Engineering Co., Division of Western Machinery Co., San Francisco, Calif.

Metallurgical Data and Results

Prod.	% Wght.	Assays Oz. Au.	Oz. Ag.	Oz. Pb.	Oz. Zn.
Feed	100.00	0.04	8.1	3.9	3.0
Pb Conc.	5.49	0.04	121.9	67.5	2.8
Zn Conc.	4.45	0.02	17.1	0.7	25.8
Tails	90.06	0.04	0.76	0.17	0.45

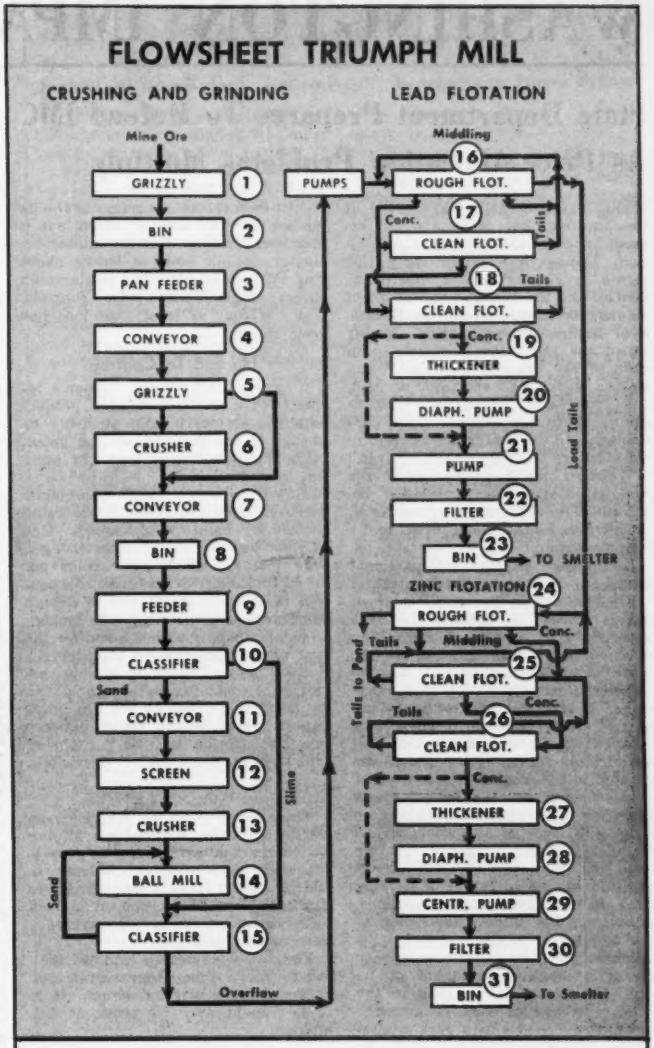
Prod.	% Wght.	Recoveries Au %	Ag %	Pb %	Zn %
Feed	100	100	100	100	100
Pb. Conc.	5.5	82.2	95.2	5.3	
Zn Conc.	1.6	9.4	0.8	81.0	
Tails	92.9	8.4	4.0	13.7	

TYPICAL GRIND

Mesh	%
+ 65	13.8
— 65+100	13.2
—100+150	10.6
—150+200	8.9
—200	53.5

REAGENTS

Lead Circuit Lb./t		Zinc Circuit Lb./t
NaCN	0.10	—
$ZnSO_4$	0.05	—
$CuSO_4$	—	0.52
Lime	—	1.35
MIC	0.03	0.03
Xanthate	1.07	0.088



LEGEND

1. Grizzly, -10 in.
2. Coarse-ore bin, 525-ton
3. S-A pan feeder, 30-in.
4. Belt conveyor, 30-in.
5. Grizzly, -2 in.
6. Blake crusher, 15x24-in.
7. Belt conveyor, 24-in.
8. Fine-ore bin, 300-ton
9. Feeder
10. Wemco spiral classifier (washer), 48-in.
11. Belt conveyor, 18-in.
12. Allis-Chalmers vibrating screen (½ in.)
13. Symons cone crusher, 2-ft.
14. Allis-Chalmers ball mill, 7x6-ft.
15. Wemco spiral classifier, 36-in.
16. Fagergren flotation machine, 6-cell.
17. Fagergren cleaner, 2-cell.
18. Fagergren cleaner, 1-cell
19. Thickener, 20-ft.
20. Diaphragm pump
21. Centrifugal sand pump
22. Eimco filter, 2-leaf.
23. Lead concentrate storage bin, 75-ton
24. Fagergren flotation machine, 6-cell.
25. Fagergren cleaner, 2-cell.
26. Fagergren cleaner, 1-cell.
27. Thickener, 20-ft.
28. Diaphragm pump
29. Centrifugal sand pump
30. Eimco filter, 3-leaf
31. Zinc concentrate storage bin, 75-ton

WASHINGTON IMPACT

State Department Prepares To Defend IMC As Price-Allocation Problems Multiply

MINING INDUSTRY CRITICISM of the International Materials Conferences (such as expressed at the Colorado Mining Association early this month by Felix Wormser, vice president of the St. Joseph Lead Co.) got an unexpected supporter in the Senate. Sen. Homer Ferguson (Rep., Mich,) called the IMC "this fantastic brain child of the State Department," and blamed it for the shortage of lead, zinc, tungsten, sulphur and molybdenum. Ferguson said the U. S. participation in the conference is "selling our standard of living down the river."

Wormser made pretty much the same point in his Denver address. He described the IMC as a super-cartel, socialist-sponsored, and a threat to the free market.

In defense, the State Department issued a statement which stressed IMC's weaknesses as an allocater of metals. Instead of fighting the issue out simply on a basis of controlling inflation, as it was expected to do, State pointed out that IMC has no right to order any nation to do anything. It stressed that voluntary nature of all agreements; it passed the buck to the Defense Production Administration for accepting allocations granted to this country.

This means that the State Department has no intention of hanging on to the IMC type of allocation beyond the mobilization emergency. At the same time, it showed that the Administration has no intention of backing away from international allocations, as long as they fit into the mobilization picture.

Behind the scenes, IMC has been having a top-level argument of its own. U. S. experts assigned to the conference have stressed its failure to make price agreements a part of allocations. They pointed out that an allocation, such as that granted the U. S. for copper, is meaningless without an agreement on price, too. The U. S. got a big increase in copper allocations for the first quarter, but the copper hasn't shown up. Other countries continue to get it because they can bid more than U. S. ceiling prices.

The argument has been settled. IMC decided it should not press for price agreements; it is going ahead with allocations on the present system. This means less copper and probably less of other scarce materials, over the short-run. But it also means that IMC itself is backing away from any real effort to rigidly control international markets. It will still try to influence the movement of materials with its "entitlements to consumption"—its phrase for the kind of allocations it has been making. But the mining industry doesn't have to worry about any IMC-sponsored effort to clamp on direct international price controls. For the time at least, that idea has been shelved.

No End To Controls

Congress isn't taking Truman's request for a two-year defense production act seriously. But it looks as though a one-year act will be voted, without much change from the present law.

Efforts to have minerals and metals removed from price control are being pushed by industry spokesmen. One of their big arguments is the changed lead picture, which now seems out from under price pressure. Suspension of the duty may result in enough Mexican lead coming into the country to balance supply with demand for the rest of the mobilization program.

But Congress is afraid to vote special price control exceptions, and is in no mood to be blamed for any price spurts which might occur between now and election day. So it probably will keep all price control provisions.

DMPA Policy Shifts

There is more to the deal between DMPA and the White Pine Mining Co. than a healthy increase in copper. It marks an important change in DMPA policy. DMPA has agreed to buy enough of the output at a fixed price to underwrite a big part of a government loan.

First, RFC agreed to lend $57,185,000 to White Pine under section 302 of the defense production act. It is to be repaid over 20 years at 5% interest.

The purchase agreement—now complete except for a few legal details—guarantees that DMPA will buy $28,665,000 worth of copper from the project over a 10-year period, if White Pine can't sell it on the open market for 25.5¢ per lb. or better. The general price ceiling on lake copper is 24⅝¢.

Mobilization officials have shied away from deals of this kind, on the grounds that they would remove normal business risk from development projects. However, they have realized for six months that sooner or later they would have to face the issue if they wanted to get maximum results from DMPA. What they were afraid of was a kick-back eventually from critical congressmen. They decided the copper shortage made a good setting to try out the new policy, and see what happens. If no serious objections are raised, DMPA may make a few similar deals.

DMPA Reorganizes

DMPA finally put the "approved" stamp on the organization as it has been functioning the past couple of months. Howard I. Young tops the organization chart as deputy administrator, reporting to Administrator Jess Larson. James Douglas is next in command with the title of assistant deputy administrator. His job is to work with Young in general supervision of the operating divisions.

Tom Lyon, who was director of the Supply Division of Defense Minerals Administration, is director of the Domestic Expansion Division of DMPA. This includes operations in Canada as well as the U. S.

As reported previously, Charles Stott, former director of the Strategic Materials Division of ECA, is director of DMPA's Foreign Expansion Division. Harold Montag heads the Mining Requirements Division, as he did in DMA.

A. B. Parsons, who was assistant director of the Supply Division of DMA, is acting director of DMPA's Program Development Division. His duties include collecting information on current and prospective supply of metals and minerals. He will obtain estimates of military and civilian requirements and will work with other DMPA divisions in developing programs aimed at closing the gap between supply and demand. When the programs are drawn up, he will take them to the Defense Production Administration for approval.

The task of working out contracts with domestic producers was assigned to John G. Ford, as acting director of the Contract Negotiation Division. He has done similar work under Larson's direction in General Administration. He will review contracts with foreign producers, though the actual negotiations will be carried out by Stott's division.

Titanium's New Role

Titanium is—temporarily at least—playing a new role as the wonder metal. Producers are wondering what to do with it.

Du Pont reports that output is running ahead of demand. This doesn't mean the metal is disappointing researchers; it just means that experiments aren't using up as much metal as expected, and that cost bars its use for commercial purposes.

Officially the military is again on record in favor of a big titanium expansion. A new survey of strategic

and critical metals for the air force puts it high on the future list. It estimates demand will be 9-million lb. this year. It adds that "at present it does not seem probable that this estimated demand will be met."

The reason for the Air Force's interest was pointed up by the chief engineer of Douglas Aircraft Co., who said aluminum would not work on airplanes which fly faster than 900 mi. per hr. at sea level, or 1,200 mi. per hour at 35,000 ft. At such speeds, air friction creates temperatures around 200 deg. F. and aluminum begins to weaken. Titanium looks promising as a solution, he said, but it is still too expensive for large-scale use.

No Change in AEC Bonus

AEC doesn't see any reason to change its uranium bonus policies, despite protests by the Uranium Producers Association. The Association represents about 150 producers in Colorado, Utah, Arizona, and New Mexico. Its chief complaint was that mills paid widely varying prices. It called for AEC to closely supervise assaying, or order to wipe out price variations which the Association said at times reached 20% between two Colorado mills.

AEC's answer was that producers are not required to deliver ore to any particular mill. If they can make money by shipping further, that's all right with AEC. The Commission stressed that its fixed prices are minimums. Mills cannot pay less, but if they want to pay more, that's all right with AEC, too. If producers question the fairness of assaying, they can always use the umpire provision in AEC regulations, the Commission argued.

Brief But Important

THE SENATE COMMITTEE ON FINANCE favorably reported a bill to suspend the import duties on tungsten ores and concentrates. It refused to go along with a House version which would also remove the duty on tungsten metal and alloys. Both versions call for renewal of the duty if the price falls below $63 per short ton unit of tungsten trioxide. Both bills name *E&MJ Metal & Mineral Market's* quotations as the price guide.

IN DEFENSE OF ITS BUDGET REQUESTS, the Geological Survey told a House appropriations sub-committee that the value of zinc deposits discovered by the Survey near Knoxville, Tenn., would be about $135-million. It was described as the most important zinc discovery in the U. S. in 39 years.

A $400,000 EXPANSION PROGRAM by the Compania Minera di Huehuetenango of Guatemala City, will result in 26,500 tons of pig lead for U. S. consumers beginning in 1954, DMPA announced. Deliveries will be spread over five years.

LABOR THIS MONTH

Joseph M. Gambatese, McGraw-Hill Washington News Bureau

COPING WITH COMMUNISTS: Washington is tilting at windmills on what to do about communist union leaders. Lots of talk, little action. With elections coming, there's still less chance that Justice Department will prosecute under Taft-Hartley for false non-communist affidavits.

SENATE HEARINGS: The Humphrey Labor-Management Subcommittee is holding hearings on possible legislative approach to communist problem. In sounding out all sides (except the left-wing unions), it got these reactions:

FROM CIO: CIO cleaned house; no new law needed.

FROM NLRB: NLRB has plugged every hole it could find. Take Maurice Travis, secretary-treasurer of Mine, Mill and Smelter Workers; he resigned Communist Party, then signed non-communist oath; yet he pledged continued fight for communist goals. NLRB sent Justice Department photostatic copy of affidavit. No results yet.

FROM JUSTICE DEPARTMENT: Affidavit rule should be strengthened so government would not have to prove communist membership on day oath is signed. Bill pending in house. New idea: Maybe NLRB could be empowered to refuse to certify any union that is communist-dominated, even if affidavits are filed.

NLRB REVERSED: An employer (Stewart-Warner) is upheld by U. S. court of appeals against NLRB decision that he violated law by denying campaign privileges to left-wing, noncomplying union while giving free rein, assistance and recognition to right-wing union, eventual election winner.

MINE, MILL LOSES: Voting for bargaining representative at St. Joe's Missouri properties showed 1,441 for CIO Gas & Coke Workers, 901 for Mine-Mill. Nips Mine-Mill's come-back down there in the bud.

PEOPLE: James J. Leary, former secretary of Mine, Mill and Smelter Workers, is now stationed in New York as United Nations representative of the International Confederation of free trade unions. ICFTU is the new right-wing rival of the left-wing world federations of trade unions.

Whereabouts of Reid Robinson, former Mine-Mill chief, remains a mystery.

Leary fought Robinson's left-wing leadership bitterly before being expelled from Mine-Mill.

WAGES, PRICES STILL UPWARD: Even before a steel wage increase, pay of nonferrous miners keeps rising. That's because wages are tied to cost of living in government regulations and many union contracts. Latest settlements:

KENNECOTT AND MINE-MILL: 33¢ a day, retroactive to Jan. 1. Contract expires June 1.

EMPIRE ZINC AND MINE-MILL: Average 24¢ hourly raise, $100 monthly pension, and company-paid $2,500 life insurance, ending 15-month strike at Hanover (N. M.) mine. (Almost simultaneously, NLRB trial examiner held Mine-Mill picket-line violence during strike, violated Taft-Hartley.)

ST. JOSEPH LEAD AND CIO GLASS WORKERS: 10½¢ hourly increase and company-paid hospitalization, ending three-month strike.

INTERNATIONAL NICKEL AND MINE-MILL: Interim increases of 5½¢ an hour, bringing total increases to Ontario workers to more than 30¢ an hour over a year's time.

These are just a few examples of the wage "freeze" Mine-Mill and other left-wing unions are out to "break."

WATCHING WSB: Wage disputes have piled up at the Wage Stabilization Board. Besides basic steel, some of interest to mining:

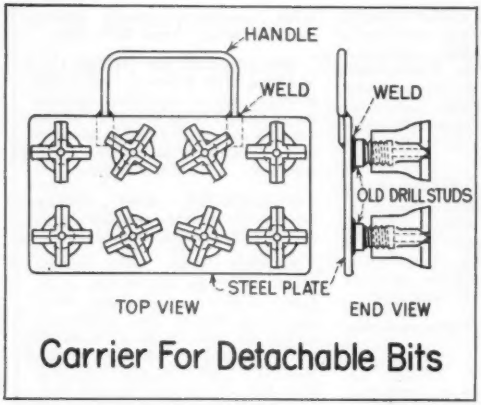
GARDNER-DENVER AND CIO STEEL WORKERS: WSB agreed to decide two points in dispute in a job evaluation plan. Company makes mining equipment.

COPPER AND BRASS MILLS AND CIO AUTO WORKERS: WSB panel has recommended general increase of 15¢ an hour.

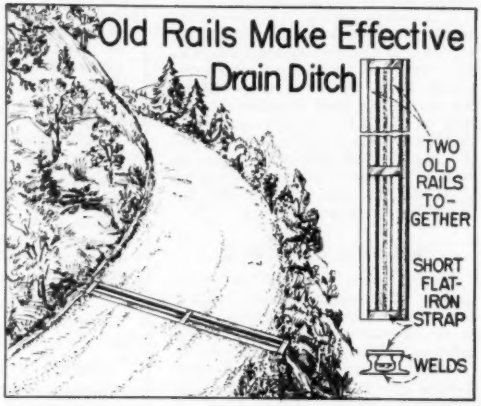
COMBINED METALS REDUCTION CO. AND NEW PARK MINING CO. AND CIO STEEL UNION: WSB considering request that it intervene in dispute over a job evaluation plan.

1951 COPPER STRIKE: President Truman, of Feb. 14, reported to Congress on 15¢ settlement of last summer's copper dispute under Taft-Hartley. As of Nov. 23, disputes still continued at six operations after expiration of 80-day injunction. At eight companies, NLRB polled workers on management's final offer.

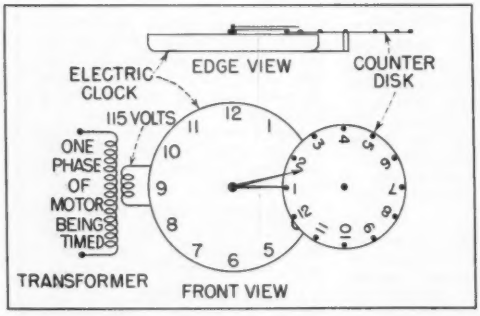
OPERATING IDEAS



IN ITS SHOPS Day Mines, Inc., makes these simple carriers for threaded bits. Besides minimizing loss of bits, these carriers keep the threads clean.



DAY MINES, INC. makes this effective, long-lasting, easy-to-install drain ditch from two old rails and three short pieces of strap.



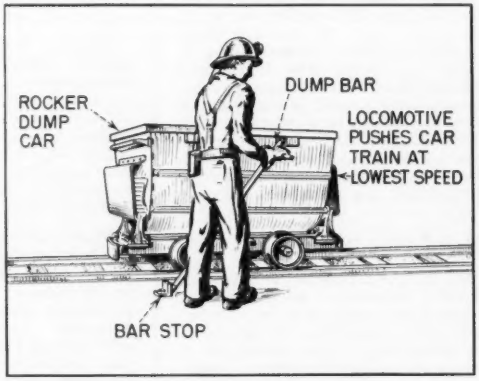
Electric Clock Records In-Use Time of Motors

By PAUL C. ZIEMKE, Oak Ridge, Tenn.

If you need to keep track of the time that a pump, slusher, or other electrically driven unit is in operation, here's a simple way to record it. The equipment consists of:

A transformer, connected on the load side of the switch, is placed across one phase of the motor being timed. It is a dry-type unit which furnishes 115-volt power to the clock.

The clock is fitted with a counter disc, placed as shown in the sketch. At each digit on the counter disc, a small spaced pin projects just high enough so that the hour hand will engage it, but the minute hand will not. Each time the hour hand makes a cycle (every 12 hours), it turns the counter disc one notch. The time-in-operation is figured by reading the counter disc and the clock.



Bar Speeds Dumping of Rocker Cars

Before using this bar, miners at Pend Oreille Mines & Metals Co., Metaline Falls, Wash., dumped their rocker cars by hand.

The bar, fitted with a short handle and chisel-like steel ends, is made from 2-in. pipe.

It works like this: The motorman stops his train a short distance from the dump ramp. The dumping operator picks up the dumping bar, engages it in the stop, and the motorman slowly drives his string through the dumping station. As each car approaches, the operator lowers the top of the bar to engage the stop in the upper car-body rim. The bar lifts and dumps the car as it passes.

The result is a semi-automatic operation that's both faster and safer.

Exide-Ironclad

BATTERIES

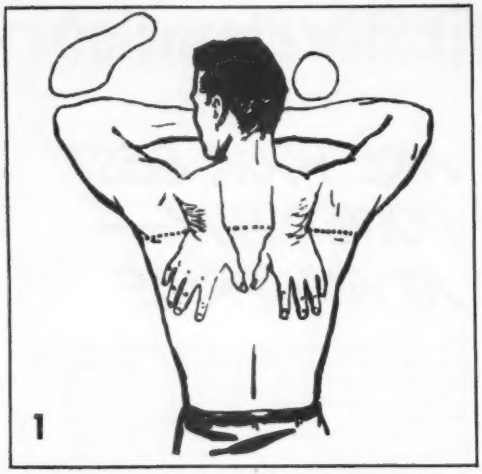
ARE YOUR BEST POWER BUY— AT ANY PRICE

They PROVIDE ample power for fast, high-production haulage—more trips per shift, dependable round-the-clock performance, with no end-of-shift slowdown, no unscheduled down time . . . ASSURE inherent safety, with freedom from hazards of fire, fumes, noise . . . SHOW low costs of operation, maintenance, repair, depreciation. SIZES for all makes of battery-powered mine locomotives, trammers, shuttle cars. Call in an Exide Representative and let him prove these facts.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto
"Exide-Ironclad" *Reg. Trade-mark U. S. Pat. Off.*

Here's the New System of Artificial Respiration

American Red Cross and a number of other national organizations have adopted a new method of applying manual artificial respiration. It's called the back-pressure arm-lift method, in contrast to the prone-pressure (Schafer) method. Advantage of the new system is that it provides forced inhalation and exhalation, whereas in the Schafer system, only exhalation was forced. Timing of the back-pressure arm-lift method allows for 12 complete breaths every minute—2½ seconds for each inhalation or exhalation.



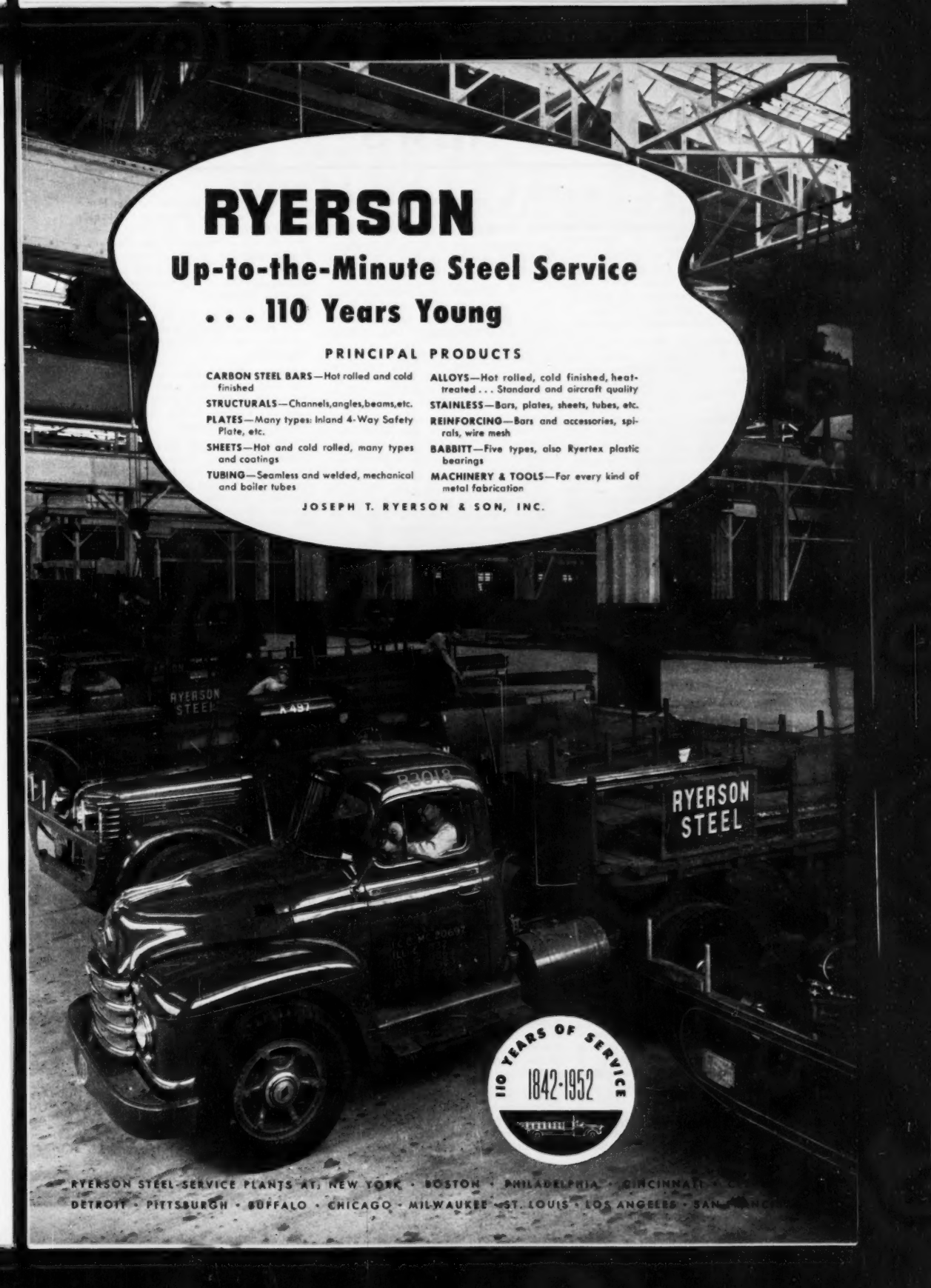
CORRECT POSITION. Victim lies on stomach with hands placed on one another, cheek resting on hands. Operator kneels at head of patient, places hands on victim's back so that heels of hands lie just below a line running between victim's armpits.

START CYCLE. Operator leans back, places hands so that thumbs just touch one another.

EXPEL AIR. Operator rocks slowly forward, keeping arms straight until nearly vertical.

HELP HIM INHALE. Then operator rocks backward, sliding hands to just above victim's elbows.

COMPLETE CYCLE. Operator rocks backward, raises arms till he feels bind in shoulders, drops arms.


RYERSON
Up-to-the-Minute Steel Service
. . . 110 Years Young
PRINCIPAL PRODUCTS
CARBON STEEL BARS—Hot rolled and cold finished
STRUCTURALS—Channels, angles, beams, etc.
PLATES—Many types: Inland 4-Way Safety Plate, etc.
SHEETS—Hot and cold rolled, many types and coatings
TUBING—Seamless and welded, mechanical and boiler tubes
ALLOYS—Hot rolled, cold finished, heat-treated . . . Standard and aircraft quality
STAINLESS—Bars, plates, sheets, tubes, etc.
REINFORCING—Bars and accessories, spirals, wire mesh
BABBITT—Five types, also Ryertex plastic bearings
MACHINERY & TOOLS—For every kind of metal fabrication
JOSEPH T. RYERSON & SON, INC.
RYERSON STEEL
RYERSON STEEL
110 YEARS OF SERVICE
1842-1952
RYERSON STEEL-SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI •
DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES •

PERSONAL NEWS

C. E. White, Yellowknife, N.W.T., has been appointed district superintendent for North Central Canada by Consolidated Mining & Smelting Company of Canada.

John V. Beall, editor of *Mining Engineering*, New York, N. Y., has been appointed manager of publications for the American Institute of Mining and Metallurgical Engineers.

John R. Quayle, Hanna Iron Ore Co., Iron River district, Mich., has been appointed superintendent of the Hiawatha mine, succeeding **Duane S. Myers**, general superintendent of mines, E. W. Coons Co., Hibbing, Minn. **Walter A. Lundwall** is now assistant superintendent of the Homer-Wauseca mines. **Clyde S. Hoar** has been appointed mining captain at the Homer mine. **Glenn E. Johnson** has been promoted to mining captain and **George Gehlhoof** has been made a shift boss at the Wauseca mine.

R. Pitman Hooper is now general manager at Broken Hill to The Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd., South Wales, Australia. **J. W. Foots** and **George Brooks** are assistant general managers of production and services, respectively.

R. Bartholomew has been appointed mine manager to Hansel Mundy Gold Mining Co., Australia.

John H. Eggers, Los Angeles, Calif., has been elected president of the Mining Association of the Southwest for 1952, succeeding **Howard Kegley**, retired. Mr. Kegley was elected a director. Other officers: **H. W. Howe**, vice president; **S. Paul Lindau**, second vice president; **Victor J. Hayek**, secretary; and **P. J. Osdick**, third vice president.

L. F. Pett advanced to general superintendent of operations at the Utah Copper Division of Kennecott Copper Co., Salt Lake City, Utah. **J. C. Landenberger, Jr.**, director of labor relations, succeeded Mr. Pett as general superintendent of mines. Assistant mine superintendent **V. S. Barlow** was promoted to the post of mine superintendent. **Joseph A. Norden, Jr.**, former assistant drilling and blasting foreman, was promoted to director of labor relations.

Dan Edwards, Utah industrial commissioner who assisted in the settlement of several major Utah mining disputes, has resigned to accept a position as commissioner of conciliation for the Federal Mediation and Conciliation Service.

Ernest D. LeMay, retired public relations director of Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., has opened offices to be known as E. D. LeMay Associates.

P. N. Pitcher has been appointed general manager of Giant Yellowknife Gold Mines, Yellowknife, N.W.T. Mr. Pitcher succeeds the late **A. K. Muir.**

P. H. Sevensma has been appointed senior mine geologist at the Sullivan Mine, Consolidated Mining and Smelting Company of Canada Ltd., at Kimberley, B. C.

C. J. Abrams has been appointed general manager of operations for Climax Molybdenum at Climax, Colo. Mr. Abrams has been general superintendent of operations since 1939. **Franklin Coolbaugh** has been promoted from assistant general superintendent to resident manager of operations.

P. K. Sims, Lakewood, Colo., is now working on trace element studies for the Mineral Deposits Branch of the U. S. Geological Survey.

Edwin J. Carlson, chief of field parties, Special Minerals Investigation Branch, U. S. Bureau of Mines in the western states, has been sent to the Mt. Weather, Va., and Washington, D. C., offices to assume additional responsibilities.

LOUIS BUCHMAN has been elected vice president and director of Kennecott Copper Corp., Salt Lake City, Utah. Mr. Buchman will continue to supervise all Kennecott's western mining divisions, of which he has been general manager since 1948.

At the Cleveland Cliffs Iron Co., Michigan, **J. S. Westwater** is now district superintendent; **Hugo H. Korpinen**, superintendent of Mather Mine A shaft; **Harry C. Swanson**, superintendent of Mather Mine B shaft; **H. Walter Rembold**, superintendent of the exploratory drilling division.

Appointments in Defense Materials Procurement Agency, Washington, D. C.: **James Douglas**, assistant deputy administrator; **Tom Lyon**, director of the Domestic Expansion Division; **Charles E. Stott**, director of the Foreign Expansion Division; **Harold Montag**, director of the Mining Requirements Division; **A. B. Parsons**, acting director of the Program Development Division; and **John G. Ford**, acting director of the Contract Negotiations Division.

Henry M. Hart has been promoted from general mining engineer to chief engineer for E. W. Coons Co., Hibbing, Minn.

Maurice R. Schaller, Duluth, Minn., has been appointed assistant superintendent of Oliver Iron Mining Division of United States Steel Corp. timberland department.

In a series of staff changes at Utah Copper Division, Kennecott Copper Co., Salt Lake City, **R. E. Cromar**, formerly Salt Lake buyer, was named assistant to the local purchasing agent. **Duane O. Olsen**, secretary to the assistant general manager, was transferred to the New York offices. **S. W. Jacques** was promoted from assistant to chief mine accountant; **E. B. McFarlane** succeeded Mr. Jacques as assistant chief mine accountant. **L. O. Hamlin** was promoted to employment director.

James K. Richardson, industrial engineer for Kennecott Copper Co.'s western mining division, was named assistant to the general manager in charge of public, industrial, and labor relations, succeeding **Roy Hatch.**

Norman A. Moberg has been named assistant to the general mining engineer of Oliver Iron Mining Division, United States Steel Corp., Duluth, Minn.

Kenneth H. McInnis, Eveleth, Minn., has been named superintendent of Oliver Iron Mining Division's Hull-Nelson property. **Charles V. Wargstrom**, Eveleth, is to be assistant superintendent. **David Hartley**, Virginia, succeeds Mr. McInnis as superintendent of the Canton mine. **William H. Wright**, Virginia, is assistant superintendent at the Rouchleau pit.

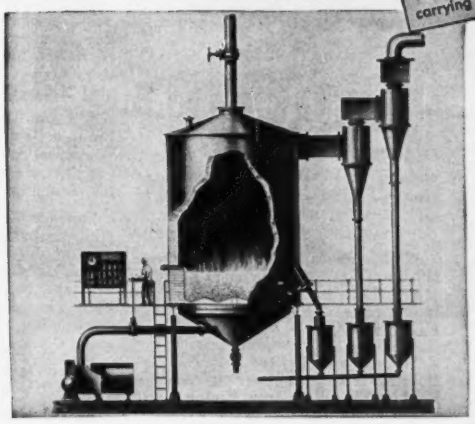
Richard W. Smith has been appointed manager of the Natural Resources Department Committee of the National Chamber of Commerce, Washington, D. C.

S. E. Zelenkov, who has been superintendent of Asarco's mining operations at Leadville, Colo., has been transferred to Lima, Peru, as manager of operations of the Northern Peru Mining and Smelting Co., an Asarco subsidiary.

The Utah Mining Association in a special January 28 election named **W. G. Rouillard**, manager of ASARCO's Garfield plant, as 1952 president. Mr.

Can you use 14-15% SO_2 GAS from PYRITE

Dorrco FluoSolids* will produce it . . . at lower investment and operating costs than conventional roasters.



FACTS ON SO_2 PRODUCTION BY FLUOSOLIDS

GAS STRENGTH will average 14-15% SO_2 dry basis from pyrite carrying 48-50% sulphur.

GAS CLEANING EQUIPMENT is smaller because of smaller gas volumes.

FEED can be relatively coarse . . . flotation concentrate to 35 mesh—jig or table concentrate to 14 mesh.

MINIMUM MAINTENANCE . . . no moving parts exposed to high temperature—long refractory life.

NO SCALING . . . temperature accurately controlled below fusion point.

NO EXTRANEOUS FUEL is needed once fluidized bed is up to calcining temperature.

PROCESS SHUT-DOWNS of two or three days present no roasting problem.

COMPLETE INSTRUMENTATION eliminates the personal factor in operation.

● Sulphuric acid manufacturers and all users of sulphur dioxide faced with a shortage of elemental sulphur will find in FluoSolids an economically feasible means of tapping sulphides as an alternate source of SO_2. Utilizing the principle of fluidization, The Dorrco FluoSolids System is a distinct departure from conventional roasters. It brings SO_2 production from those sources down to a reasonable investment and operating cost level.

Its economy, simplicity and ease of operation are indicated by the facts above. For more detailed information write to The Dorr Company, Stamford, Conn., or in Canada, The Dorr Company, 80 Richmond Street West, Toronto 1.

*FluoSolids is a trademark of The Dorr Company, Reg. U. S. Pat. Off.

Better Tools TODAY for more tomorrows

DORRCO

DORR

WORLD-WIDE RESEARCH · ENGINEERING · EQUIPMENT

THE DORR COMPANY · ENGINEERS · STAMFORD, CONN.

Associated Companies and Representatives in the principal cities of the world

Rouillard was elected following the announced transfer of **R. D. Bradford**, former western department manager for ASARCO, to New York, N. Y. **E. M. Tittman**, ASARCO's new western general manager, has been elected to the board of directors. **Miles Romney**, Cassiá County, is secretary-manager of the Association; **Cecil Fitch, Jr.**, Eureka, first vice president; **J. Parnell Caulfield**, Salt Lake City, second vice president; and **A. G. Mackenzie**, vice president and consultant.

James Burton Scott has resigned from the International Smelting & Refining Co., Tooele, Utah, to join the Mineral Deposits Branch, U. S. Geological Survey, Grand Junction, Colo.

Peter E. Galli is now with U. S. Smelting, Refining & Mining Co. as a dredge surveyor at Fairbanks, Alaska.

Raymundo Llamas has been employed as superintendent of mines at the Compania Minera Guadalupe, S. A., Mexico.

Charles H. Moore, former technical director of National Lead Co. and inventor-developer of rutile gems, has been appointed head of the metal and ceramic division, P. R. Mallory & Co., Inc., Indianapolis, Ind.

W. A. Wall has left Deloro Smelting & Refining Co., Ont., to join Cariboo Gold Quartz Mining Co., Wells, B. C., as mill superintendent.

T. H. Cain, Hibbing, Minn., has retired as assistant superintendent of the Godfrey underground mine, Oliver Iron Mining Division after 30-odd years with the company.

The M. A. Hanna Co., Mesabi Range, Minn., has announced the promotion of three men to pit foreman: **Robert Boutang** at the South Agnew mine; **Ludwig Mayerle** at the Carlz mine; and **Tony Rose** at Section 18 mine.

Ben G. Messer, formerly chief mine engineer with Miami Copper Co., is mine engineer for Duval Sulphur & Potash Co., Potash Division, Carlsbad, N. M.

Keith Kunze has left Central Mining Co. to become mill superintendent at the Getchell Mine, Red House, Nev.

F. A. McGonigle is now general manager, Haile Mines, Inc., New York, N. Y., and general manager of Manganese, Inc., Henderson, Nev.

Donald B. Rockwell, mining engineer, Tempe, Ariz., has retired after 50 years in the industry.

M. A. Kuryla, industrial relations engineer for the U. S. Smelting, Refining and Mining Co., has been appointed industrial relations manager, western division, USSR&M, Salt Lake City, Utah.

L. S. Breckon, western field engineer for the Kennecott Copper Corp., has been appointed district geologist at Sydney, Australia.

Dr. P. M. Chase, plant physician of the Utah Copper Division, Kennecott Copper Corp.'s mill at Arthur, Utah, has retired after 32 years. Dr. Chase will be succeeded by **Dr. R. A. Gallant**, Butte, Mont.

J. H. Moses has resigned as chief geologist for Cerro de Pasco Corp., Peru, to become chief geologist for Reynolds Mining Corp., Little Rock, Ark. Mr. Moses succeeds the late **Dr. O. C. Schmedeman**.

FREDERICK W. HOLSHUHER, formerly controller of Hills Brothers Co., has been appointed controller of the Cerro de Pasco Corp., New York, N. Y.

W. R. Lindsay, Toronto, has been appointed general manager of Kilembe Mines, Ltd., the Frobisher controlled copper-cobalt property in Uganda, East Africa.

Alexander R. McLeod is now in the Duluth, Minn., engineering department of the Oliver Iron Mining Division, United States Steel Corp. **James A. Vitzhum**, Virginia, Minn., succeeds Mr. McLeod as superintendent of maintenance.

FORBES K. WILSON has been appointed manager of mineral exploration for Freeport Sulphur Co., New York, N. Y. Mr. Wilson formerly served as assistant general manager at the company's Cuban subsidiary, Nicaro Nickel Co.

Donald D. Smith has been appointed president of Central Eureka Mining Co., Sutter Creek, Calif. **Arthur E. Kendall**, general manager of the mine properties, and **John K. Plant**, vice president of Hercules Equipment and Rubber Co. and president of Davis Construction Co., were elected directors. **Keith Kunze**, former vice president, has resigned to join Getchell Mines Co., Red House, Nev.

Abe W. Mathews, Jr., formerly with Western Knapp Engineering Co., Hibbing, Minn., has established the Abe W. Mathews Engineering Co. in Hibbing.

Edwin C. Johnson has been appointed superintendent of M. A. Hanna's new Enterprise mine at Virginia, Minn.

L. M. Becker, Crosby, has been appointed superintendent of Pickands Mather & Co.'s new West Hill mine on the western Mesabi, Minn.

John V. Reardon has been appointed Seattle branch manager of the American Smelting and Refining Co. **Henry B. Nelson** has been named Portland, Ore., branch manager of the Federated Metals division for the company.

William D. Johnston, Jr., chief, Foreign Geology Branch of the U. S. Geological Survey, Washington, D. C., has been elected a foreign member of the Brazilian Academy of Sciences.

Paul Zinner, director of Region V at Minneapolis, Minn., has been named chief of the Minerals Division, Washington, D. C. **Paul T. Allsman**, now with the Denver, Colo., office of the Bureau, was named to fill the regional directorship at Minneapolis.

John A. Wood, Albuquerque, N. M., has been elected president of the New Mexico Mining Asscciation for 1952.

John C. Kinnear, assistant to Defense Mobilization Chief Charles E. Wilson, has been re-elected president of the Nevada Mine Operators Association for the twenty-sixth consecutive time.

Dr. D. F. Kidd, consulting geologist and an officer and director of a number of Canadian companies in British Columbia, has been elected president of the Canadian Institute of Mining and Metallurgy for 1952.

Harold W. Newton and **William C. Gifford** have been named assistant sales managers of Barber-Greene Co., Aurora, Ill.

William H. Newton has been appointed sales manager of the ore beneficiation division of Jeffrey Manufacturing Co., Columbus, Ohio.

J. P. Sullivan has been appointed district manager of Goodman Manufacturing Co.'s Pittsburgh, Pa., sales office, replacing **R. C. Beerbower**, retired.

E. A. Schwartz, Cleveland, Ohio, has been appointed assistant vice president of operations of Republic Steel Corp.

Chester H. Steele has been named general manager of western mining

RAW MATERIAL shortage will never hit the Northwest Magnesite Company's Cape May, New Jersey plant, for its basic source of supply is seawater—its basic end product, magnesia. In this utilization of modern processing techniques to tap the virtually unlimited chemical resources of the sea, sedimentation is of primary importance.

At Cape May, the jobs of preliminary treatment of seawater and subsequent thickening and washing of magnesium hydrate are carried out in Dorr Thickeners—six of them, ranging from 150 to 320 feet in diameter.

It is particularly significant that these steps are handled by Dorrs at every major seawater magnesia operation in the U. S. . . . regardless of whether the end product is refractory, metal or both.

No matter what the application, when you need thickeners it will pay to check Dorr . . . the oldest manufacturer of sedimentation equipment *with the newest ideas.*

BETTER TOOLS today TO MEET TOMORROW'S DEMAND

DORR

WORLD-WIDE RESEARCH · ENGINEERING · EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in the principal cities of the world

operations for Anaconda Copper Mining Co., Butte, Mont. Succeeding Mr. Steele as head of the Butte mines geological department is **Edward P. Shea. John W. Warren** is chief ventilation and industrial hygiene engineer for western operations replacing **A. S. Richardson**, retired. **Martin K. Hannifan** has been appointed assistant general superintendent of mines in charge of the Kelley Mine.

Fred H. Stewart, formerly general superintendent, has been appointed general manager of Southwest Potash Corp. **W. Aubrey Smith** has been promoted from mill superintendent to assistant general manager.

Thomas N. Peck, director of the aluminum alloy division of the Vanadium Corporation of America, has been appointed deputy director of the aluminum and magnesium divisions of NPA. Mr. Peck succeeds **T. A. Lynch**, director of the division.

Evald V. Nelson, Chisholm, Minn., has been promoted from assistant superintendent in the Hibbing district to superintendent of the Rouchleau-Auburn mine, Mesabi Range.

Dudley L. Rainey has joined the Foote Mineral Co. as mining engineer of the company's Kings Mountain, N. C., branch. Mr. Rainey was formerly with Columbia University.

Fridolin Simard, Amos, Que., was appointed to the board of directors of Pershcourt Goldfields Ltd.

A. B. Rathbone has been named special assistant to the president of Oglebay, Norton & Co., Cleveland, Ohio.

George G. Thomas has resigned as general manager of Buchans Mining Co., St. John's, Newfoundland, to serve the company as a consultant.

R. V. Porritt is now general manager of Noranda Mines, Ltd., Toronto.

James S. Wroth has resigned as executive vice president and director of International Mining Corp., New York, N. Y.

Thomas T. Tigert, assistant manager and mine superintendent of Central Patricia Gold Mines Ltd., has been appointed manager of the Cassiar Asbestos Corp., McDame Creek, B. C.

Martin Weil has retired as head of the scrap metal department of International Minerals & Metals Corp., New York, N. Y., after 42 years. **Theodore Gruen** will succeed him. **Frederick R. Jeffrey** is now manager of the ore department and **H. Fred Behrwald**, assistant to the president.

R. D. Bradford, general manager of western smelting operations for the American Smelting and Refining Co. since 1949, is transferring to the New York offices of the firm late this spring. Succeeding Mr. Bradford at Salt Lake City, Utah, is **E. M. Tittman**, formerly southwestern department manager at El Paso, Tex.

Lindsay M. Kinney has been appointed general superintendent for Pend Oreille and Reeves MacDonald operations in the Salmo, B. C., area. **Loren G. Billings** succeeds Mr. Kinney as mine superintendent for Pend Oreille in Metaline Falls, Wash.

OBITUARIES

Ralph N. Frost, first sergeant, Company A, 27th Army Engineers, in World War I, died on Jan. 18, at 71. Mr. Frost, of Wakefield, Mass., was sales representative for A. C. Purrington Co.

Irving J. Isbell, 77, died in Toronto early in January following a lengthy illness. Born in Virginia, "I. J." spent most of his adult life in Canada where he shared the financing and development of almost every mining camp of prominence. A colorful and dynamic figure, Mr. Isbell had a nation-wide acquaintance among the mining and promotion fraternity.

Joseph F. Woodbury, Silver City, Nev., attorney, known in the Southwest as a brilliant mining attorney and one of the founders of the New Mexico Mining Association, died at Silver City, December 7.

Frank A. Walsh, design engineer for the Research and Development Division of the New Mexico Institute of Mining and Technology, died January 28 in Palos Verdes Estates, Calif.

Best known as a former mine manager for Lake Shore Mines in Kirkland Lake, but also remembered for his work in the early days of Porcupine, **Robert C. Coffey** died in Orlando, Fla., in January. He was 70, and at the time of his death was director of Upper Canada Mines and Madsen Red Lake Gold Mines.

Russell C. Johnson, 52, passed away on December 3. Mr. Johnson was in charge of all American Smelting and Refining Co.'s operations in Bolivia and Peru. He had been employed by Asarco since 1923 and was formerly managing director, Northern Peru Mining and Smelting Co. and Cia. American Smelting Boliviana, S. A.

William J. "Bill" Labarge was the victim of an automobile accident near Edmonton, Alta. Mine superintendent for many years at Hardrock Gold Mines, he moved last year to Yukon, where he was in charge of operations at Brewis Red Lake Mines.

Joe F. Mora died at his home in Monterrey, Mex., on December 12. He was for 30-odd years ore buyer for American Smelting and Refining Co. Much-traveled, Mr. Mora did much to foster understanding between ore producers and managers of the company's smelters.

Louis D. Perkins, 63, Salt Lake City, Utah, died January 14. Mr. Perkins was vice president of Madison Mines Co., Treasure Hill Mines Co. and Oil Securities Inc. As a masonry contractor, he had been active in the erection of blast furnaces of the American Smelting and Refining Co. at Magna, and maintenance plant buildings at Kennecott Copper Corp.'s Bingham operation.

Swedish-born **John G. Granberg**, 61, died of a heart attack on December 1 in Centralia, Ill. Mr. Granberg had been manager of the Federated Metals Division zinc smelting plant of American Smelting and Refining Co., Beckemeyer, Ill.

APPRECIATION
ALBERT F. WOLBERT

Albert Foster Wolbert, a Bradley Mining Co. superintendent, passed away from a heart attack at the age of 57. He was at his home at the Sulphur Bank Mine, near Clearlake Oaks, Calif., when death came on January 4, 1952. His many friends and associates are finding it hard to believe that stout, jovial, popular "Al" Wolbert has departed from their midst.

Al was born in Baltimore, Md., on June 16, 1894, the only child of an army officer. Al and his mother followed the father on his tours of duty, which included a stay in Honolulu. After his return to the mainland, Al enrolled at the St. Matthews Academy, south of San Francisco. Al then worked for the California Ore Testing Co. in San Francisco. In 1915 he was transferred to the Atolia Mining Co. as assistant superintendent of their tungsten mine in San Bernardino.

Army service in World War I interrupted Al's career in 1918, but four years later he returned to Atolia as general superintendent. In 1923 he started open pit work in Atolia's famous "spud patch." In 1927 Al was transferred to the Sulphur Bank quicksilver property in Lake County.

The early years at Sulphur Bank were arduous ones, including the breaking-in of a new quicksilver plant, the trial and eventual abandonment of a flotation plant, and the expansion of open pit mining with its waste disposal problems. Al's celebrated "know-how" in the open pit field was augmented by inspection tours to the Mesabi Range.

Later Al was able to buy his home on Clear Lake and tend his beloved hot-house and garden. He also had time to intensify his community efforts, including a closely-contested but unsuccessful bid for a county supervisorial post.

The year 1951 was a very rough one for Al, physically and emotionally. In the spring he and Mrs. Wolbert were both hospitalized with severe heart attacks. Grace succumbed to a second attack. Al was never the same after that. Another blow came in the summer when his father died.

Al is survived by a son, Alton, now living in Stockton, Calif., and by Mrs. Patricia Tremper of Clearlake.

WORTHEN BRADLEY

NEW!
THE TR 200
REAR DUMP
MOTOR WAGON

Here's your NEW LaPLANT-CHOATE ROCK WAGON

HERE'S a new addition to the well-known LaPlant-Choate line of Motor Wagons and Earthmovers. The 18-ton TR 200 is a hydraulically-controlled rear dump wagon flexibly joined to the same big rubber-tired tractor so successfully used on the LaPlant-Choate TS 200 Motor Scraper. It combines rugged power, big capacity and high speed with a host of other features to make this unit outstanding in its field.

FEATURES YOU'VE BEEN LOOKING FOR IN A REAR DUMP WAGON

- Stable wheel base assures absolute safety when dumping over edge.
- Rock Lug tires.
- Protected cab.
- Your choice of two diesel engines in the T 200 Tractor . . . a 176 HP Buda or a 165 HP Cummins.
- No obstructions in the wagon body.
- Tilts to 70° from horizontal.
- Full hydraulic control.
- Rear dump advantages.
- Available with heated body for use in cold climate to prevent freezing of material in load.

TR 200 MOTOR WAGON SPECIFICATIONS

GENERAL

CAPACITY	
Struck, cu. yds.	11
Heaped, cu. yds.	15
Tons	18
OVERALL DIMENSIONS	
Length	25'9"
Width	10'7"
Height	10'0"
WHEEL BASE	13'7"
WHEEL TREAD	
Tractor	6'8"
Wagon	8'8"
TIRES	4—21.00 x 25—24 ply rock lug
BRAKES	
4-wheel air Timken-Detroit	18" x 7"
TURNING	
Width required 180° turn	31'3"
Degree of turn each way	60°
HYDRAULIC SYSTEM	LPC Fluid Power Unit
Steering—25 GPM	Model HU25
Wagon operation—40 GPM	Model HU40
SHIPPING WEIGHT	
(Approx. in lbs.)	40,000

T 200 TRACTOR

ENGINE	
Buda Diesel Model 6-DA-779	176 HP
or	
Cummins Diesel Model HRB-600	165 HP
ENGINE CLUTCH	17" Lipe Rollway
TRANSMISSION	Fuller 5A1120
SPEEDS	
(at 1800 RPM—MPH)	From 2.46 to 21.63
STARTING METHOD	Electric 24 V
AIR COMPRESSOR	
Bendix-Westinghouse	7¼ cu. ft. capacity
ELECTRIC SYSTEM	12 V
FUEL TANK CAPACITY—U. S. gallons	70

R 200 WAGON

MISCELLANEOUS DIMENSIONS	
Loading height, rear	5'6"
Loading height, side	8'3"
Bowl width	8'0"
Bowl depth, maximum	4'8"
Bowl length	11'3"
OPERATING METHOD	
Type of ejection	Rear dump, hyd. lift
Number of jacks (double acting)	2
Size of jacks	8" x 31"
DUMPING ANGLE	70°

LaPLANT-CHOATE

MANUFACTURING CO., INC.

CEDAR RAPIDS, IOWA, U. S. A.

Cable-operated Scrapers in 6-, 8- and 14-yd. sizes for all makes of track-type tractors.

2- and 4-yd. Scrapers for track-type and rubber-tired industrial tractors.

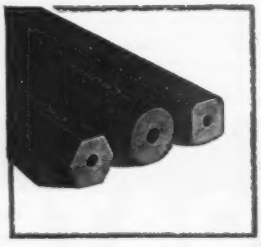
Hydraulic and Cable-operated Dozers.

ON TOP

or

UNDERGROUND

it's
CRUCIBLE
HOLLOW
DRILL STEEL
all the way



Whether driving a tunnel or clearing a mountain pass — tough Crucible Hollow Drill Steel gets the job done better, faster — at lower cost per foot drilled. This quality steel is built to take the punishment of around-the-clock operation of modern, high air-pressure rock drills. And you have the assurance of minimum breakage . . . and an end to expensive bit loss.

That's because of Crucible's rigid *pre-testing* of every *lot* of Crucible Hollow Drill Steel. What's more, Crucible Hollow Drill Steel is backed by the experience of quality steelmakers. Then too, field metallurgists with broad background on *your* job are available — should you need them.

Insure the quality of your job — cut costs — use Crucible Hollow Drill Steel.

CRUCIBLE first name in special purpose steels

52 years of Fine steelmaking **HOLLOW DRILL STEEL**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

NEW PRODUCTS DIGEST

For further information on these products, circle item number on card—insert and mail.

A Revolutionary Development

New Type of Rectifier Is Made With Germanium

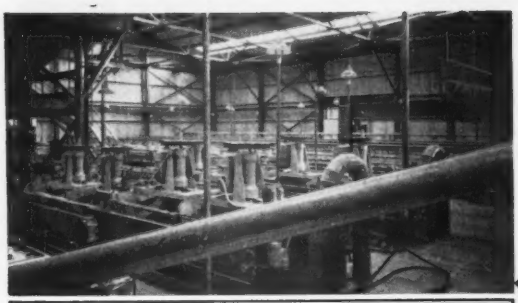
GENERAL ELECTRIC CO. ANNOUNCES a new line of industrial rectifiers which can operate at current densities up to 1,000 times greater than existing copper oxide or selenium stacks. Made from germanium, this unit is considered to be the best rectifying material yet discovered. These industrial rectifiers are now being produced in limited quantities in these models: single-phase, half-wave ratings of 12 v./0.4 amp.; 21 v./0.4 amp.; 27 v./0.4 amp.; 6 v./6 amp. Two models, RA-1 (left) and RA-2 (right) are shown above. The industrial germanium rectifiers are designed for power conversion in intricate computing machines, radar devices, and other applications where size and weight requirements are at a premium. Physically these new rectifiers occupy about 10 cu. in. per kw of output capacity compared to about 350 cu. in. per kw for selenium. Germanium in its natural state is not normally adapted for use in rectifiers. It must be treated to bring out its rectification properties.

Operation tests of the new rectifiers at the rated voltage over a 5,000-hour period indicate no change in forward resistance and reverse leakage.

[Editor's Note: While these units are of limited size, it is known that work is being done on rectifiers for much heavier currents (300 amp.). Hence this will be an important development to watch. See also E&MJ's article on germanium transistors, February, 1952 page 154.]

For more information circle (1) on card.

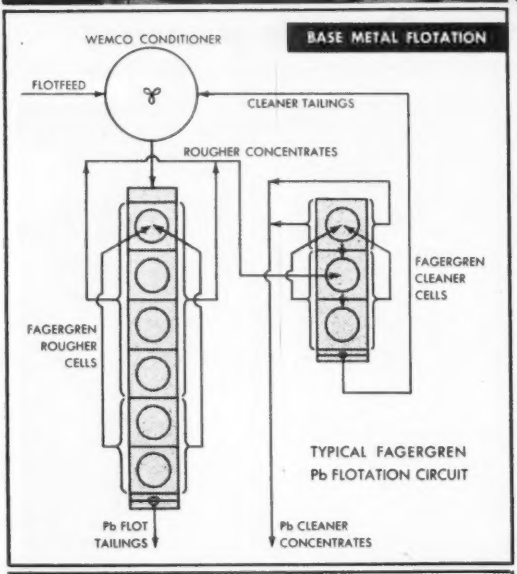
(1)

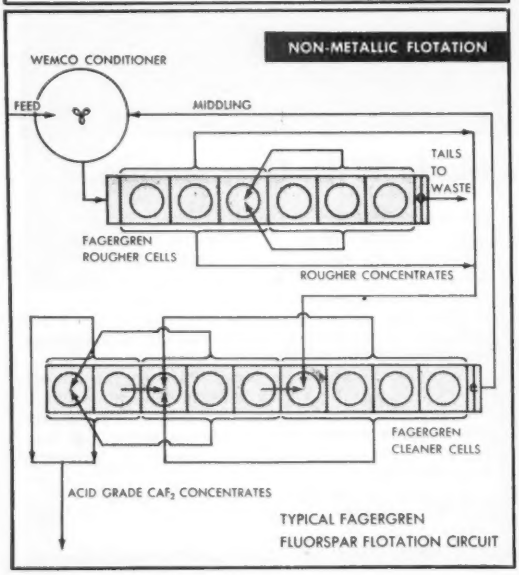


FAGERGRENS!

for

FLEXIBILITY OF CELL ARRANGEMENT





The flexibility of cell arrangements provided by Fagergren Flotation Machines is depicted on the accompanying flowsheets. Fagergrens give top performance in medium size and small circuits by the recirculation of flotation products to effect cleaner, recleaner and secondary rougher operations. Cells are arranged for product transfer by:

- ***gravity flow***
- ***on one floor level***
- ***without using auxiliary sand pumping equipment***

Maximum flexibility of cell arrangement is gained while retaining the high metallurgical efficiency provided by the Fagergren rotor-stator principle of pulp aeration and dispersion.

Check these advantages of

FAGERGREN FLEXIBILITY

- *low installation costs*
- *low operating costs*
- *high metallurgical efficiency*
- *large capacity*
- *minimum attendance*
- *minimum maintenance*
- *low reagent cost*

Write today for further information on how to use Fagergren Flexibility to improve **your** flotation results.

WEMCO
WESTERN MACHINERY COMPANY
760 766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

OTHER **WEMCO** PRODUCTS
Mobil-Mills • Cool Spirals • HMS Thickeners • HMS Pumps • Sand Pumps Cone Separators • Drum Separators • Fagergren Laboratory Units • Agitators Fagergren & Steffensen Flotation Machines • Hydroseparators • S-H Classifiers HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

DRAGLINE BUCKET CHAINS. Dimensions and details of Tisco manganese steel dragline bucket chains are given in a new bulletin by Taylor-Wharton Iron & Steel Co., High Bridge, N. J. **(40)**

HOW TO LOCATE TROLLEY FROGS. Engineers and mechanics in the haulage department will find this article useful. It appears in "O-B Haulage Ways" published by Ohio Brass Co., Mansfield, Ohio. **(41)**

ELECTRO-ANALYSIS. A new 20-page manual outlining methods for analysis of copper and lead by electromethods has been prepared by Eberbach Corp., Ann Arbor, Mich. for distribution with its Electro-Analysis Apparatus. **(42)**

FILTER PRESSES. T. Shriver & Co., Inc., Harrison, N. J. has just put out a handsome indexed 36-page booklet telling and illustrating how the Shriver filter works, how to select a filter press, type of presses available, important mechanical and operating details, type of filter media, costs of presses, and applications of the units for various products. **(43)**

ORE HANDLER. Details of Baltimore and Ohio Railroad's new ore unloading facilities capable of unloading 2,000 tons of iron ore per hour are described and illustrated in Vol. 199 of the "S A Conveyor" put out by Stephen-Adamson Mfg. Co., Aurora, Ill. **(44)**

PROCESS MACHINERY. Hardinge Co., Inc., York, Pa., has just published Bulletin 100-A describing and illustrating its complete line of machinery for mining, chemical, ceramics, and mineral processing. Equipment covered includes agitating, mixing, calcining, clarifying, classifying-separating, conveying, cooling, digesting, drying, flocculating, feeding, filtering, grinding-pulverizing, sampling, scrubbing, thickening-concentrating, pumping, and other units. **(45)**

IS YOUR AIR COMPRESSOR CAPACITY EFFECTIVE? To find out, circle (46) below. This will bring you a technical bulletin No. 5 published by Sarco Co., Inc., New York 1, N.Y., showing how to keep air in a compressor system clean, cool, free from fumes, and dry. Every compressor operator will find this booklet useful. **(46)**

AREA FLOW METERS. A new development, a predictable metering float for "area" flow-rate meters, is now in stock for immediate shipment at Fischer & Porter Co., Hatboro, Pa. Sizes and prices of this equipment are given in a booklet just released. **(47)**

V-BELTS. Raybestos-Manhattan, Inc., Passaic, N. J. has released a new bulletin showing how the new improved Manhattan single-groove V-belt is constructed. Tables of standard sizes and belt numbers are included **(48)**

WEIGHTOMETER. Merrick Scale Mfg. Co., Passaic, N. J., has released a new bulletin No. 851 describing and illustrating various applications of Merrick Weightometers and Feedoweights. **(49)**

NICKEL ALLOY STEEL CASTINGS. Uses of nickel alloy steel castings for rugged service in mines, mills, and smelters are included in a 32-page illustrated booklet just published by International Nickel Co., Inc., New York 5, N.Y. **(50)**

SELF-PROPELLED SCRAPER. The new Model TC-S142 Terra Cobra self-propelled scraper is described and illustrated in a bulletin just released by Wooldridge Manufacturing Co., Sunnyvale, Calif. Capacity is 17.5 cu. yd. This new model Terra Cobra is powered by a 225-hp. Cummins diesel engine. **(51)**

OSCILLATING CONVEYOR. A fine engineering booklet No. 2444 has just been released by Link-Belt Co., Chicago 1, Ill. which enables you to determine where and how to use the Link-Belt-Action Oscillating Conveyor. **(52)**

GRINDING MILLS. One of the most comprehensive collections of engineering data on grinding mills for rock, cement, chemical, and mining applications is contained in a new 44-page bulletin by Allis-Chalmers Mfg. Co., Milwaukee, Wis. This booklet is virtually a condensed handbook on grinding. A useful table of conversion factors is included. **(53)**

RECONDITIONED MACHINERY. A complete line of reconditioned mine, mill, smelting, electrical and shop machinery is described and illustrated in a new catalog by Morse Bros. Machinery Co., Denver, Colo. **(54)**

BLENDING. Hewitt-Robins, Inc., New York 7, N.Y. has just published a profusely illustrated booklet on blending which includes these chapter headings: What Is Blending?; The Advantages of Blending; Principles of Blending, Mixing, Proportioning, Evaluation; Methods of Blending; Bin Blending; the Hewitt-Robins Blending System; Ore Reclaimers; Coal Reclaimers; Blending for the Blast Furnace; Blending for the Copper Smelter; Blending for Raw Material Conservation; Blending for General Industry. To receive a copy of this booklet, use card below. **(55)**

CRANE TRUCKS. A rubber-tired locomotive type crane truck, handy for moving and lifting heavy shop parts and equipment is made by Baker Industrial Truck Division, Baker-Raulng Co., Cleveland, Ohio. **(56)**

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not Good after June 1, 1952, if mailed in U. S. or Canada.

NOT GOOD AFTER JUNE 1, 1952—If mailed in U. S. or Canada March, 1952

Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	15	22	29	36	43	50	57	64
2	9	16	23	30	37	44	51	58	65
3	10	17	24	31	38	45	52	59	66
4	11	18	25	32	39	46	53	60	67
5	12	19	26	33	40	47	54	61	68
6	13	20	27	34	41	48	55	62	69
7	14	21	28	35	42	49	56	63	70

My Name..... Position.....

Company .....

Address .....

Equipment Shorts

ORE FEEDERS. A complete line of manganese steel feeders for mines and quarries is presented in a new booklet by Pioneer Engineering Works, Inc., Minneapolis 13, Minn. Pioneer-Oro feeders are especially designed to handle shock loads of heavy abrasive material. Pans and all wearing parts are of manganese steel alloy. (57)

TRUCKS. The full line of Ford '52 trucks is shown in a new bulletin giving complete specification sheets for light, heavy, and extra heavy-duty models. Released by Ford Motor Co., Dearborn, Mich. (58)

PHENOLIC RESINS. A modified phenolic resin, Phenoline No. 300 is offered by Carboline Co., New York 10, N.Y. which may be applied to steel, concrete, and wood, and resists various acids, bases, and reagents. It may be applied by trowel, brush, or spray. (59)

MINE CABLES. A 52-page engineering catalog covering a complete line of electrical wires and cables for the coal mining industry has been published by the United States Rubber Co., New York 20, N.Y. Engineering data on splicing and patching, current-carrying capacities, conductor resistance, temperature-correction factors, and formulas for determining amperes are included. (60)

HYDRAULIC SETTING REFRACTORIES. Smeltermen cannot afford to overlook the new 12-page illustrated booklet "Hydraulic Setting Refractories" published by Johns-Manville, New York 16, N.Y. Two products—"Firecrete" for casting special refractory shapes, and "Blazecrete" for gunning and slap-troweling applications—are described. These products resist heat up to 3000 deg.F. (61)

TOTALLY-ENCLOSED MOTORS. Complete details on Allis-Chalmers, totally-enclosed, fan-cooled motors, are given in a new pamphlet. Designs range from 40 hp. at 600 rpm through 800 hp. at 3600 rpm. These units are for applications requiring protection of windings from dust, dirt, acid fumes, etc. (62)

PROTECTIVE COATINGS. A complete line of protective coatings against acids, alkalies, water, oils, solvents, weather, high heat, and abrasion is offered by David E. Long Corp., New York 17, N.Y. (63)

BIN VIBRATOR. Martin Engineering Co., Kewanee, Ill. now makes the "Vibrolator" for installation in hoppers and bins to keep materials flowing freely. A pneumatically driven ball traveling around a stationary hardened two-rail race does the trick. The unit is self-starting, quiet in operation, and requires no lubrication. (64)

SILICONES. A complete line of silicones is listed and briefly described in "A Reference Guide to Dow Corning Silicone Products." These products include silicone fluids, water repellents, compounds, greases, resins and varnishes, silicone rubber, and a long list of silicone chemicals. Perhaps millmen will be able to find some use for an anti-foam emulsion which is used in very small amounts to break down froth. Smeltermen should investigate the greases and lubricants that perform under extremely low or high temperatures. Mine electricians who are plagued with insulation failures due to heat, oil, or moisture should take a second look at silicone insulations which resist these conditions, and do not burn to carbon (a conductor) when overheated. Motors insulated with silicones can operate safely way above rated temperatures, and even under water. Here's your chance to explore a long list of useful silicone products which may eliminate many operating headaches. (65)

ELECTRIC MINE HOISTS. This book published by Westinghouse Electric Co., East Pittsburgh, Pa. is an excellent handbook on mine hoisting. In addition to describing various electrical systems, it contains instruction and examples enabling the reader to calculate power and equipment requirements for various installations. (66)

X-RAY DIFRACTION. North American Philips Co., Inc., Mount Vernon, N.Y. offers an interesting pamphlet which tells you what X-ray difraction is and how it can be used. (67)

HANDY DRILLING GUIDE. Rockbit Sales and Service Co., Philadelphia, Pa., has issued a practical booklet telling how to get the most service out of carbide Rok-Bits. The handy guide tells how to install the bit, how to remove the bit, how to inspect threads, how to sharpen the bit, and concludes with other important suggestions pertaining to the Rockbit line of threaded bits and intra-set drill steel. (68)

LIQUID-LEVEL CONTROLLERS. Minneapolis-Honeywell Regulator Co., Philadelphia 44, Pa., offers a data sheet describing, illustrating and giving specifications for internal-float and external-float liquid-level controllers to maintain proper liquid level in tanks. (69)

DUST RECOVERY UNITS. Buell Engineering Co., New York 5, N.Y., describes and illustrates a complete line of dust recovery and collecting equipment in their new booklet "The Collection and Recovery of Industrial Dusts." Units included are Buell cyclone systems, electric precipitators, low-draft collectors, collectors for small boilers, combined collectors, and hopper discharge valves. All principles of operation are shown in simple, clear line drawings. (70)

FIRST CLASS
PERMIT NO. 64
(Sec. 34.9, P.L.&R.)
NEW YORK, N. Y.

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in The United States

Postage Will Be Paid By—

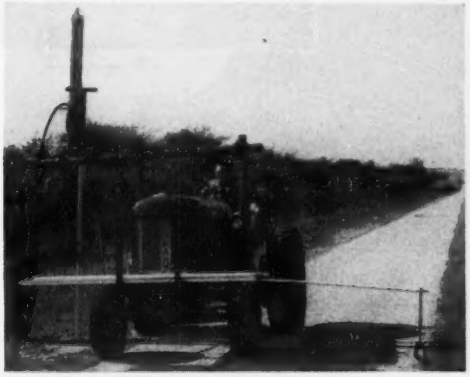
McGRAW-HILL PUBLISHING CO., INC.
ENGINEERING & MINING JOURNAL
330 WEST 42nd STREET
NEW YORK 36, N. Y.

USE THIS CONVENIENT CARD

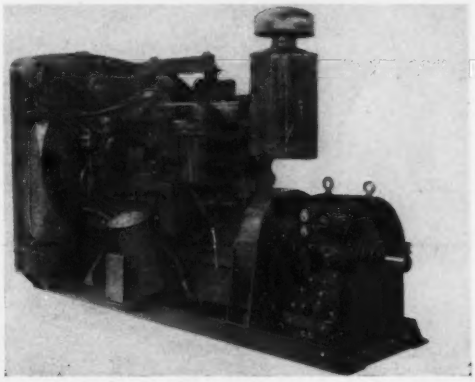
to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, on reverse side, tear out and mail.

STRIP HEATERS. Atlas Car and Mfg. Co., Cleveland, Ohio, now installs a lacework of General Electric Co.'s strip heaters under the floor of its 60-ton bottom-dump ore transfer cars to keep ore from freezing and sticking. (2)

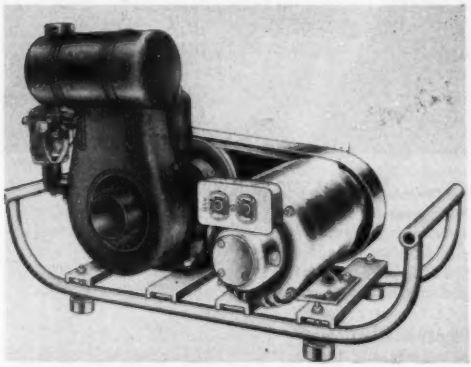
AIR TRAMMER. This light versatile unit made by Universal Dredge Mfg. Co., Denver 4, Colo., is good for 300 to 400-ft. hauls, operates on 100-lb. compressed air. Called the "Cageair." Useful in stopes and cramped areas. (3)



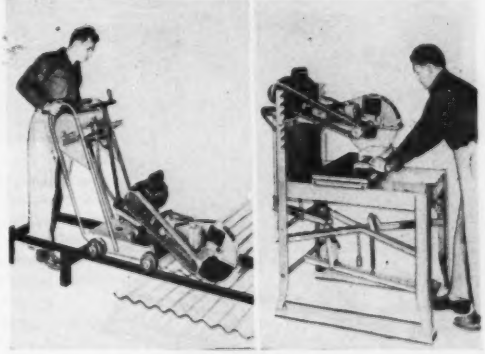
PNEUMADRIVER. Made by Schramm, Inc., West Chester, Pa., this model combines portable self-propelled compressor with pneumatic hammer. Was used to drive stakes (350 per day) on the New Jersey Turnpike. Does the same amount of work formerly done by 13 men. (5)



TORQUE CONVERTER. The Torcon Corp., Ashtabula, Ohio, announces this new 17-K single-stage, three-element, torque converter. Can be used on gas or diesel engines rated up to 300-hp. The unit is roller-bearing equipped. Variable torque ratio is as high as 3:1. (4)

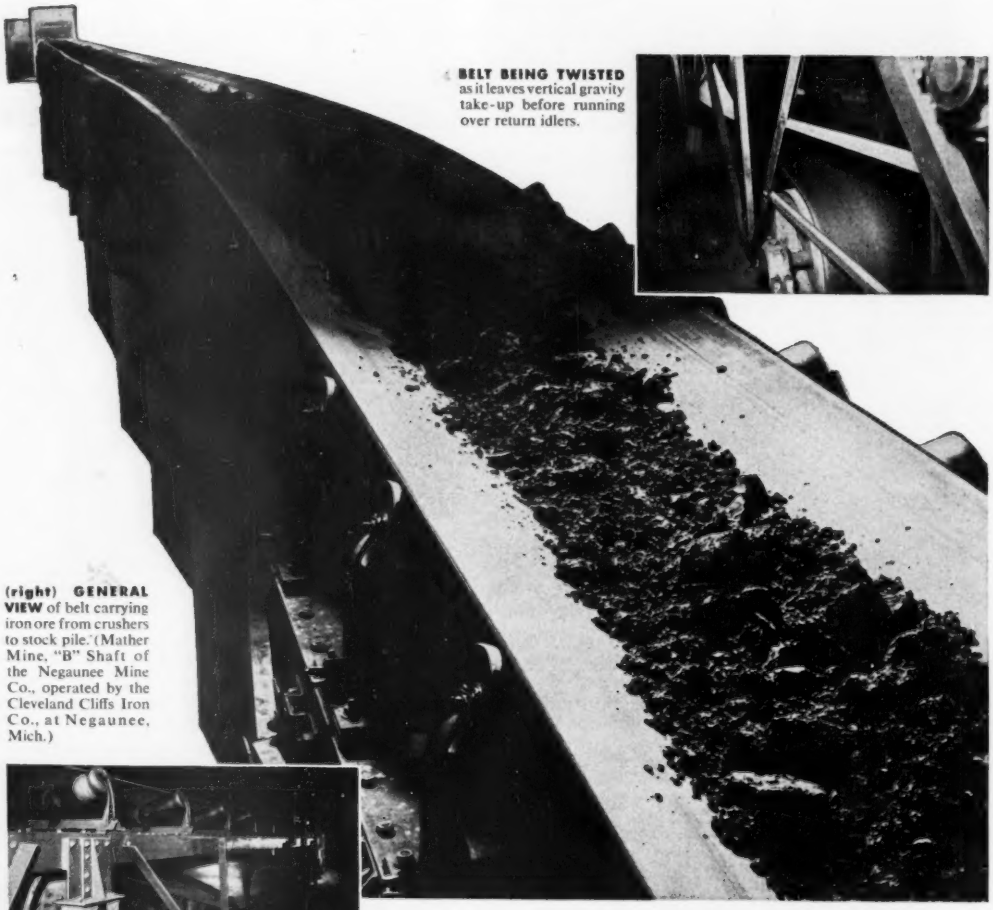


ELECTRIC GENERATOR. Wincharger Corp., Sioux City, Iowa, announces a new portable gas-engine-driven electric generator available in three ratings: 1,000; 1,250; and 1,350 w. at 150 v., 60 cyc. ac. Good for portable power tools, emergency repair trucks, floodlights, etc. (6)



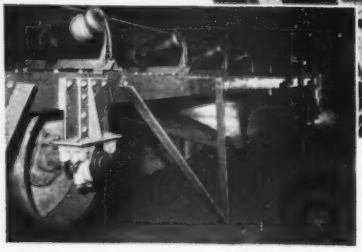
MASONRY SAW. Clipper Mfg. Co., Kansas City 8, Mo., make this unit for sawing or trimming tile, Transite, concrete, fire brick, etc. Can be used stationary or wheel-mounted. Should be handy to trim refractories used in furnaces and kilns at metallurgical plants. (7)

How does U. S. Rubber's twisted belt handle wet ore?



BELT BEING TWISTED as it leaves vertical gravity take-up before running over return idlers.

(right) GENERAL VIEW of belt carrying iron ore from crushers to stock pile. (Mather Mine, "B" Shaft of the Negaunee Mine Co., operated by the Cleveland Cliffs Iron Co., at Negaunee, Mich.)



RETURN STRAND of belt being twisted before reaching tail pulleys.

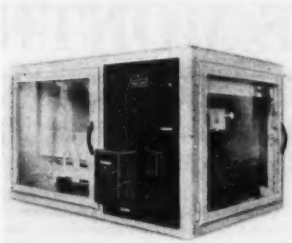
PRODUCT OF U.S.RUBBER SERVING THROUGH SCIENCE

This belt is twisted behind the head pulley to make the clean side of the belt run against the return idlers, preventing wet iron ore from building up on them. The belt is twisted again before it reaches the tail pulley, so that the load is placed on the carrying side of the belt. Installed at a mine in Michigan's Upper Peninsula, this U. S. Matchless belt is 1425 feet long, 36 inches wide. It is used to stockpile ore above ground.

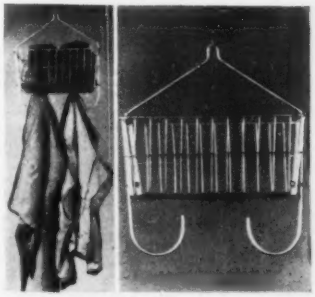
United States Rubber Company engineers have the research facilities and the experience that enable them to build the right kind of belt for your needs. They are specialists in reducing haulage costs and raising output. Write to address below.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

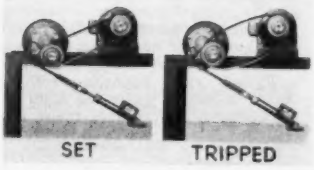


GRAVIMETRIC BELT FEEDER. Made by Omega Machine Co., Providence 1, R. I. Weighs and feeds dry materials continuously. Capacities 100 to 100,000 lb. per hour. Can be used for copperas, lime, soda ash, sand, gravel, etc. (8)

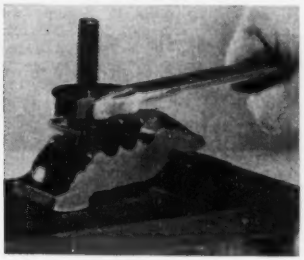


LOCKERBASKET. For the mine dry room. Made by the Moore Co., Charleston, West Va. Is sturdy, rust resistant, and will not tip. Basket volume is 1,200 cu. in. (9)

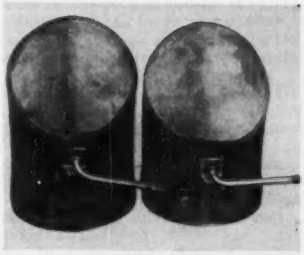
TORQUE-ARM SPEED REDUCER. Developed by Dodge Mfg. Corp., Mishawaka, Ind. When speed reducer is overloaded, the release mechanism shown loosens the belt, cuts off the current, and activates a bell or siren. Can be adjusted to operate under any load conditions. (10)



RESPIRATOR. New type called "Dustfoe No. 55." Made by Mine Safety Appliances Co., Pittsburgh 19, Pa. Weighs only 2¼ oz. Breathing resistance is cut in half. Wearers scarcely know they have a respirator on. Filter is resin-treated felt. Traps dust electrostatically as well as mechanically. (11)



HANDY CLAMP. Shape of this clamp is specially designed to hold down metal parts processed in lathes, shapers, planers, welding tables, etc. Made by Alpha Tool and Supply Co., Westwood, N.J. Price: $1.85 to $6.50. (12)



INNER TUBE. New extra heavy pneumatic inner tube for mine shuttle cars. Note new heavy type (left) compared with older type on right. Made by B. F. Goodrich Co., Akron, Ohio. (13)

NEW TUNGSTEN CARBIDE BIT. Brunner & Lay, Franklin Park, Ill., has added a new complete line of tungsten carbide bits called Brunner & Lay Rok-Bits to their products. They are available in all sizes from 1½ to 4 in. Internal threading of bit prevents bottoming of the steel when proper drill steel is used. Thread wear and damage is held to a minimum. (14)

TREATED GLOVES. Even red fuming nitric acid did not penetrate the surface and seams of these new safety gloves made by Mine Safety Appliance Co., Pittsburgh 19, Pa. Neither did 90% hydrogen peroxide. (15)

THIS MONTH

E. H. SNYDER:

Recommended an automatic bonus, payable directly to the miner, of $100 per ton for the first 500 tons of metal (copper, lead, or zinc) produced by a new mine.

JESS LARSON:

"A bonus along the lines of Ed Snyder's proposal appeals to me very much." (Mr. Larson, departing from his speech, made this comment on Mr. Snyder's proposal.)

Colorado Miners Plug for Return to Gold, and a Bonus for Production of New Mines

COLORADO MINING ASSOCIATION held its convention on Jan. 31 to Feb. 2 in Denver at the Shirley-Savoy Hotel. Topics of interest and discussion were:

Gold. Harry Sears and B. F. Pitman keynoted thoughts on gold when they asked for a unified stand by all miners in support of a gold price of about $75 to $90 per oz. (so that it would be roughly equal to its purchasing power when originally pegged at $35 per oz.). They also urged that the United States return to a form of gold standard under which all citizens could buy, hold, and/or sell gold at will.

Bonus. Small-mine operators, one after the other, endorsed a bonus amounting to 3¢ to 5¢ per lb. of contained metal. It would be paid automatically by the government, probably through the smelter, to the miner who produced the metal. It would apply to small, marginal, or new mines deserving stimulation.

Government. "A democracy is a wonderful country to live in, but a hell of a country to govern." **Howard I. Young.**

Unity. "Speaking as a private citizen and not as a public officer, I would like to see more unity in the mining industry as a whole. It's up to you [members of the industry] to call your shots, make your criticisms, and counsel us." **Jess Larson.**

Authority. "There is no specific statutory authority for the participation of the United States in this IMC conference." **Felix Wormser, reading from a letter from a high official in the State Department.**

Copper. "There are at least four substantial additions to copper production scheduled to come into operation during 1952—the Greater Butte Project in Montana; the Chile copper sulphide project in Chile; the additions to the N'Changa capacity in Rhodesia; and the new Mount Isa copper smelter in Australia. . . . People have become so used to enormous expansion of industry that 20% growth over four years may not seem very high. Actually, however, this is as large an addition to capacity as the copper industry has undertaken in any four-year period since the age of electricity arrived." **Simon D. Strauss.**

Lead-Zinc "It's my belief, based solely upon the record, that the small miners, in fact, the entire mining industry—yes, the public itself, would have been better served without government price control of lead and zinc, the two metals in which I am chiefly interested, and that a free market would have shown greater benefit to all." **Felix Wormser.**

To Sell Minerals to the Government. This is not news, but at the CMA convention, a helpful sign on the wall reminded us that the government is buying the following minerals and metals: Antimony, beryl, cadmium, chromite, columbite, copper, fluorspar, lead, molybdenum, mica, nickel, platinum-group metals, quartz crystals, tin, vanadium, zinc. **Contact Commissioner A. J. Walsh, Emergency Procurement Service, General Services Administration, 7th & D Streets SW, Washington 25, D.C.**

Yugoslavia Gets Loan for New Metal Plants

The loan. The International Bank for Reconstruction and Development recently granted a $28-million loan which will be used for a flotation plant at the Bor Copper Mines, and for a new electrolytic zinc plant near the Trepca zinc-lead mine and flotation plant. The money will be primarily in European currencies from members of the International Bank; few U. S. dollars will go into the project. The loan climaxes two years' discussions between the Bank and Yugoslavia..

The project. For Bor, besides the flotation plant, other new machinery and mine cars and locomotives will be purchased. At Trepca, the project centers around the electrolytic zinc plant.

For 1952, the outlook is one of greatly increasing mineral production. Rugged, mountainous, highly mineralized, Yugoslavia has so far been held back by a lack of money and know-how; now she's importing both of these. In Serbia, where the main deposits have been found, three new lead-zinc operations will start in 1952. Completion of the Bor electrolytic copper plant will bring production to 24,000 tons—up from 14,000 in 1951; copper-rolling mills in Sevejno are raising their capacity to 24,000 tons of copper and brass semi-manufactures, and hope to export some of these. In iron ore, the Ljubija and Vares mines will boost output to about 1.5-million tons in 1952; reserves near there (in the Republic of Bosnia-Hercegovina) are estimated at 130-million tons.

TC&I Will Import Rich Ores from Lake Superior

Tennessee Coal and Iron Division of the United States Steel Co. will soon begin receiving the first test shipments of what may eventually be a large tonnage of Lake Superior district iron ores for use in its blast furnaces, according to Arthur V. Wiebel, TCI division president.

The Lake Superior ores, considerably richer in iron content than ores mined in the Birmingham district, will be blended with local ore so as to raise the output of TCI's blast furnaces, Mr. Wiebel explained. It will be purchased from Oliver Iron Mining Division of U.S. Steel and will be shipped by rail to Birmingham. The first shipment consisted of 60 carloads of iron from three sources in the Lake Superior district.

"We expect to need more iron with which to charge our open hearth furnaces so as to increase our steel production in terms of the enlargement

IN MINING

program announced last April 15," Mr. Wiebel said. "When that program was announced, it was anticipated that we would be able to bring in richer ores from U.S. Steel's Venezuelan properties. The Venezuelan development has not progressed as rapidly as we had expected, so we are going to have to increase our metallics through the use of higher-grade domestic ore."

Mr. Wiebel said that following test work with the original shipments of Lake Superior ore, TCI will determine which grade is best suited for use in its blast furnaces. Thereafter, it is planned, he continued, to bring in 100,000 tons of the selected grade for further experimental use.

"The duration of our use of iron ore from the Lake Superior district will depend upon how soon we can begin to receive the Venezuelan ores."

Tungsten Mining Will Boost Output in July

Tungsten Mining Corp. knocked out a whopping dollar production in 1951, but 1952 production will almost surely beat that record. Tungsten's program to double mine and mill capacity (up to 600 daily tons) will begin its effects in July.

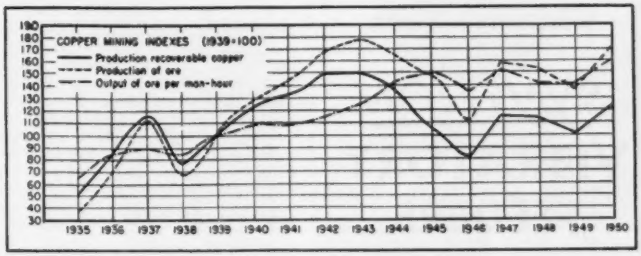
At the mill, the second 300-ton unit is scheduled to start operating by July. And since recovery in the new unit will be higher, output of concentrates should be more than double.

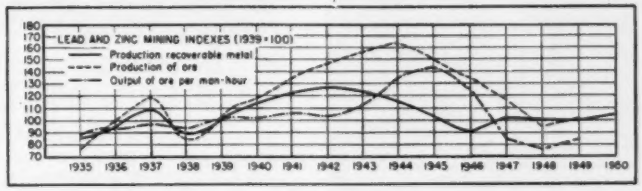
At the mine, new steel headframes, hoists, ore bins and skips will be installed at the two working shafts by October. Currently the mine is producing about 400 daily tons of ore; 325 tons goes to the mill and the rest is being stockpiled until the mill expansion is completed.

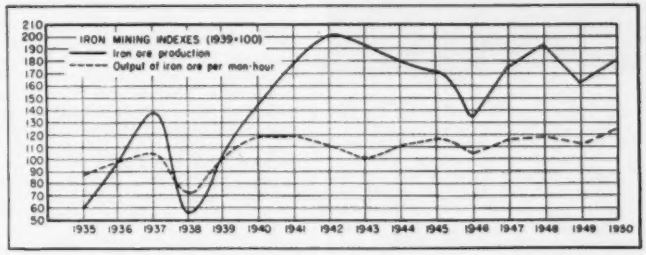
Current production is about 5,000 short-ton units per month, enough to qualify Tungsten Mining Corp. as the second largest producer in the United States. Approximately 90% of the concentrate is hubnerite with a usable tungsten content of 72 to 74%. The remaining 10% of production is as 20%-WO_3 scheelite concentrate. Total production last year was valued at nearly $4-million.

Salt Lake May Get Chemical Tungsten Plant

A $500,000 tungsten treatment plant which may be installed in Salt Lake City was seen (Feb. 5) as a result of talks between representatives of the Vitro-Manufacturing Co. and DMPA. The plant would use land and certain structures of the uranium mill now being operated by Vitro Chemical Co., a Vitro Mfg. subsidiary, in the war-built Kalunite plant at Salt Lake City. A. J. Strod, of Pittsburgh, Pa., president of Vitro's uranium division, recently discussed plans for the tungsten treatment installation with George Holderer, chief of the Ferro-Alloys Division of DMPA.


COPPER MINING INDEXES (1939=100)
Production recoverable copper
Production of ore
Output of ore per man-hour
1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950


LEAD AND ZINC MINING INDEXES (1939=100)
Production recoverable metal
Production of ore
Output of ore per man-hour
1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950



Mining Became More Productive in 1950

The above graphs were prepared from tabulations in newly released Bulletin 1046, U. S. Department of Labor, Bureau of Labor Statistics: "*Productivity Trends in Selected Industries, Indexes Through 1950.*"

Two interesting points which stand out on these graphs are:

1. The years 1938, 1946, and 1949 all show a great dip in production and efficiency. Those were also the years of big strikes in the mining industry.

2. The trend in lead-zinc mining is toward decreased production and decreased efficiency (pounds of metal per man-hour). And copper and iron mining appear to be reaching a peak of production and efficiency—the curves are leveling off.

Atomic Energy for Power May Be Near: Dunning

NOTE TO URANIUM MINERS: Here's a recent statement by Dr. John R. Dunning, dean of Columbia University's School of Engineering:

"Peacetime application of atomic energy as a power source for industry and the home may be nearer than generally supposed. Atomic power shows increased promise of being able to compete in price with coal, oil and gas in areas where these have high costs, and if this can be demonstrated successfully it is probable that its use in this respect will widen quickly."

Dr. Dunning should know. It was his initial experiment in nuclear fission, on January 25, 1939, which led to construction of the Oak Ridge plant, and eventually to the bomb.

(Continued on page 124)

Greater R.O.M. Feed Efficiency thru Vibra-Flow* Action of SYNTRON VIBRATORY FEEDERS

Two Model F-22 Syntron Feeders feeding coal from track hopper to conveyor belt. These Feeders, in this particular installation will handle a car load of coal in as fast as 20 minutes.

Syntron Vibratory Feeders offer a smooth flow of coal with finger-tip control of rate of feed to belt conveyors, elevators, trucks, railroad cars, etc. They will increase the capacity of your crushers, grinders, and the efficiency of your screens, mixers, etc. —feed coal, light fine powder or heavy coarse chunks, dry or damp, more economically.

The adaptability of Syntron Feeders to your present processing system with minimum change makes them more than ever the feeders for your coal handling installation.

There is a Model Syntron Feeder for each of your problems or needs. Your choice of sizes—from Light Tonnage Feeders with capacities from one to ten tons per hour to Heavy Tonnage Feeders with capacities up to hundreds of tons per hour.

** Vibra-Flow, the positive action of Syntron Feeders is chiefly due to the energizing of the electromagnet by a pulsating current.*

The electromagnet vibrates the trough, mounted on leaf springs, causing the coal in the trough to flow like water.

WRITE NOW FOR ILLUSTRATED FOLDER

SYNTRON CO.
510 Lexington Ave. Homer City, Pa.

Russia Appears To Be Secret Buyer of Borts

An enormous demand has come up for diamond bort. Before Korea, this industrial product was quoted at one guilder per kilogram (guilder equals $0.263) . . . now the price has risen to about 19 guilders. Demand is said to emanate mainly from behind the Iron Curtain. A few big buyers, operating in Holland and Belgium, are prepared to pay any price. The borts are then said to find their way to Soviet Russia via South America, Singapore and Pondicherry.

C&H Gets First Contract for High-Cost Copper

THE FIRST CONTRACT to assure the continued production of marginal copper mines went to Calumet & Hecla Consolidated Copper Co.

Background for the contract: C&H's cost of production from four nearly depleted mines on the Keewenaw Peninsula of Michigan had risen so that it was losing money on the metal they produced. When C&H was about to close these mines, DMPA intervened in the person of Jess Larson, administrator. (Mr. Larson announced in December that he was negotiating with nine mines whose annual output was 16,000 tons. At that time, he said "these operators have indicated that without price relief they would have to cease production . . . I think it is in the best interest of the nation . . . to keep these mines in operation.")

The contract: It covers production of four mines producing approximately 500 monthly tons of copper metal. Terminal dates are based on the known reserves of each mine; the earliest termination is Dec. 31, 1952, and the latest is May 31, 1953. Prices which C&H will receive for delivered Lake copper vary in accordance with cost of production at each mine. Iroquois mine, 30.5¢; Kearsarge No. 4, 31.0¢; Peninsula mine, 29.6¢; and Allouez mine No. 3, 29.7¢.

The Outlook: Existing copper producers who find themselves going into the red because of increasing costs of production may be eligible for similar contracts. To get them, such companies will have to "lay their books on the table" in their negotiations with DMPA.

Moroccan Phosphates May Yield By-Product Uranium

Colonel Pommerie, director of industrial production in Morocco, has confirmed that appreciable quantities of uranium have been found in the almost inexhaustible supply of Moroccan phosphates. Colonel Pommerie said that unlimited possibilities would be opened up if the extraction of uranium from the phosphates became commercially practicable. An extraction process by chemical means, perfected by the United States, was being studied in France, he explained.

Morocco produces 4,700,000 tons of phosphates every year but this production was limited by "coordination" with other North African producers so as not to prejudice smaller mines in Algeria, Colonel Pommerie said.

IN THE UNITED STATES

ALASKA

★ **U.S. Tin Corp.** planned to resume operations in February. The company had spent approximately $400,000 on its property in 1951, and, with its 137-ton mill, is set for its biggest year in 1952. B. F. Dunn of Pan American Airways, Juneau, and Lars Gillespie, Seattle, are now on the board of directors.

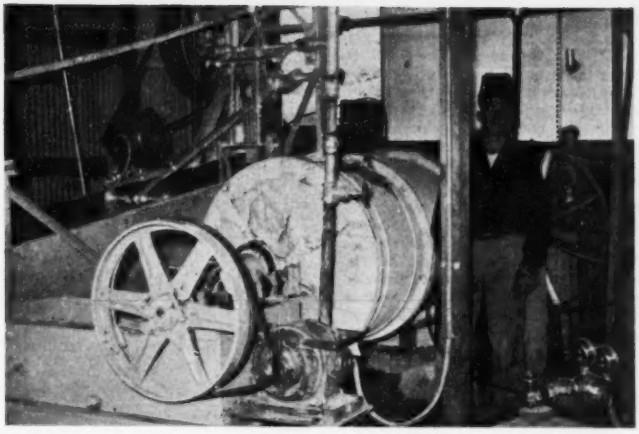
★ **R. M. Moxham** of the USGS is author of a report on pumice deposits in the Alaskan Peninsula-Cook Inlet area. The report, which also includes description of certain volcanic-ash deposits, is available from Director, USGS, Washington 25, D.C.

★ **At its jade mine** in the Arctic Cosmos hills 150 mi. north of Kotzebue, Imperial Jade Co. will install a hydro-electric and diesel-electric plant this summer. The company reportedly plans to use a new cutting process with machines now being built in the United States. Part of Imperial's jade is of gem quality, and the rest, below gem grade, is said to be going for an average of $4 per lb.

★ **Bob Lyman** will resume operation at a gold placer south of Flat this summer.

★ **Yukon Consolidated Gold Corp.** reports that it recovered $1,932,842 in gold in 1951, about $600,000 less than in 1950. The drop was caused by the short season, and by the fact that seven dredges operated in 1951 against eight in 1950. Dredge No. 4 on Bonanza Creek closed on Oct. 14, and on Nov. 19 the last two dredges, No. 8 on Middle Sulphur Creek and No. 11 on Hunker Creek, closed.

★ **Alaska Metals Mining Co.** of Fairbanks is starting a two-year program to explore for tungsten on its Stepovich, Yellow Pup, and Colbert claims. The company recently got a 75-25 exploration loan—$133,675.50 from the government matched by $44,558,-50 of company funds. This is one of the largest DMEA tungsten projects.



FRANK A. PARKER, a working president, arc welds the finishing touch on the ball-mill installation

Parker M&M Completes Tungsten Mill

A new company and a new 50-ton per-day tungsten operation is that of Parker Mining & Milling Co. at Barstow, Calif. The company operates the White Dollar mine, about 14 mi. southeast of Barstow, and has just completed a new 50-ton gravity mill on the outskirts of Barstow. With the mill shakedown completed, Parker expects to be working 50 tons of scheelite ore daily by this time. The company has applied for a DMEA loan.

ARIZONA

★ **Beneficiation charges** for manganese ores shipped to the Deming, N.M. depot have been reduced from $12 to $10 a ton.

★ **The mining industry is included among those studied in the Griffenhagen Report on Arizona taxation,** part of a reorganization plan proposed for the Arizona constitution. The report recommended:

1. Ore deposits as such be exempted from taxation and a new method of valuing producing mines be developed in consultation with the mining companies, basing the taxable value on a five-year average of a net base.

2. A new proceeds assessment of mine property be authorized by legislation and made effective at the same time that other property is reassessed.

Suggested was stabilization of mine revenues by averaging net proceeds of five years and by creating a mine-tax trust fund for each mine.

Under the present method of mine valuation, ore deposits of nonproducing mines are valued by the county assessors and those of producing mines by the state tax commission

★ **A bill proposing a** 1% production tax on Arizona mines, in addition to the 1% state sales tax to which they now are subject, promises to be bitterly fought in the present 20th Arizona Legislature.

Proposed by a member of the House Democratic minority, the bill is "for the purpose of equalizing taxes paid by the mines and the public, and at the same time raising money to finance the dormant Arizona Public Employes Retirement Act of 1948." The bill applies not only to minerals, but to other substances taken out of the ground, not excepting common sand and gravel.

Mining leaders of Arizona rose in wrath at the proposal:

They protest that mines in Arizona already are taxed higher than those of any other state, yet their products must be sold in competition with those of other states.

They claim that such a tax will foil exploration work in the state and erect a barrier against potential investments.

The mining companies already are subject to a 2% state sales tax on all they purchase, plus the 1% tax on what they produce.

★ **Stating that Mohave County** has produced more tungsten than all the rest of the state combined, the Mohave County Chamber of Commerce is sponsoring establishment of an ore purchasing depot at Kingman.

CALIFORNIA

★**Gold took a beating again in 1951**—production dropped 21% below the figure for 1950—but it still remained California's leading metal. Lead

RUBBER CONVEYOR BELTING

TOUGH COVERS — Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength (2500-3000 lbs.). Thoroughly capable of withstanding the abrasive action of bulk materials.

STRONG CARCASS — Constructed of finest quality 28 and 32 ounce tough cotton duck, properly treated and impregnated to avoid mildew from moisture and atmospheric conditions. Each ply has a 16-19 lb. average friction pull.

FLEXIBILITY — Careful attention has been given in the construction of all belts to have the proper flexibility assuring the following features: troughs easily, runs true on idlers, gouge resistant.

WHY WAIT?
WE HAVE 8" TO 48"

IMMEDIATE SHIPMENT FROM STOCK

Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
28"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	6	1/8"	1/16"	32 Oz.

SEND US YOUR INQUIRIES FOR OTHER INDUSTRIAL RUBBER PRODUCTS.

INQUIRIES FOR SIZES NOT LISTED ELEVATOR TRANSMISSION & V-BELTING ALSO IN STOCK.

Write for Free Booklet on Installation, Care & Maintenance of Conveyor Belting.

CARLYLE RUBBER CO., Inc.
64 Park Place, New York 7, N. Y.
Phone: Digby 9-3810

California *(Continued)*

slipped, silver remained about the same, and copper and zinc production rose. Value of the five metals in 1951 was $21,258,782, about 4% below 1950's total; of the 1951 total, gold contributed 56%, lead 22%, zinc 15%, silver 5%, and copper 2%.

★**In Kern County, for gypsum**—which is readily salable as a soil dressing—four locaters filed notices covering 820 acres of claims 2 mi. southwest of Maricopa. The locaters were Armon C. and Thelma E. Plummer, and C. E. and Lillie Mae Vanderford.

★**Security Mining Co. will diamond drill the Boss mine near north San Juan as soon as weather permits. Security controls more than 6,000 ft. along the copper belt which extends from Spenceville into Sierra County. The Boss mine produced high-grade copper ore many years ago and reportedly still has ore assaying $40 in combined copper, lead, zinc, and silver values.**

★**At Alleghany in Sierra County,** miners at the Yellow Jacket struck a vein of high-grade gold ore. Charles Ayres, mine manager, said at the time that the exact extent of the vein had not been determined, but that it might be an extension of the Tightner vein northward. Yellow Jacket is mining this winter, and will mill its ore in the spring.

★**M. L. Burrell** has installed new retorts at the Guadalupe mercury mine. Ore is coming from below the 100-ft. level through an inclined shaft connected with the open pit. Some dump cinnabar is also being handled.

★**On a new dragline-dredge operation** on Little Butte Creek, about 9 mi. from Chico, Thurman and Wright are reported to be working about 9,000 to 10,000 yd. daily of gravel. The dredge had been on Burns Creek in Mariposa County, but was moved to the new site several months ago. J. N. Sobrero is in charge of the operation, which has an estimated 1½ years of dredging ahead.

★**Dutch Flat Mines, Inc.,** is mining cinnabar from a 2,100-ft. vein it has uncovered in the Paradise Mining District of Humboldt County. The property consists of 19 unpatented lode claims and two unpatented placer claims. The vein was uncovered by surface stripping done early in the winter. The company plans to sink an inclined shaft to connect with two present shafts which were sunk by previous owners. Surface samples are reported to vary between .11 and .2% mercury, and underground samples are reported as high as .53%. Nicholas Crawford, Tooele, Utah, is consulting engineer on the project. Officers of the company include T. A. Cowan, of Winnemucca, president; and G. R. Harmon, M. G. White, and M. J. Bertoch, all of Salt Lake City, Utah.

★**At Mountain Pass,** just east of (and adjoining) Molybdenum Corp.'s rare-earth development, Engineers Syndicate, Ltd. is doing exploration-development work on its Bullsnake group of claims. President Walt Bilicke reports that specimens run as high as 29% rare-earth oxides. He says that if development of good mill-grade ore proceeds as expected, the company will build a concentrator in the spring.

★**Phillip Carey Co.,** Cincinnati, Ohio is diamond drilling the Stark asbestos deposits in Nevada County. Surface trenching which began last May has indicated important deposits. More than 4,000 ft. of hole will be sunk to establish depth of the principal orebody.

★**In Shasta County asbestos mining** is underway at Highland Lake and Mears Creek. Development and exploration was carried out by Johns-Manville Co. in the Highland Lake region during the last two years, while the first carload shipment from California was made last June from Loma Blanca mine on Mears Creek operated by Homer Fenn.

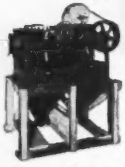
★**Sierra Copper Co.** is preparing for production from the Sierra mine near Milton in the Calaveras copper belt. In addition to the Sierra, which it leased from Donner & Castle, the com-

Denver-Dillon Vibrating Screens

Denver Ore Feeders

Denver Steel-Head Ball Mills

Denver Disc Filters

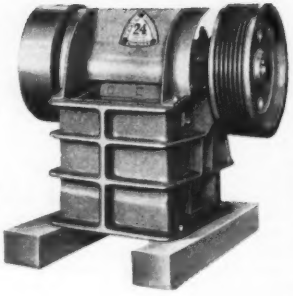

Denver Selective Mineral Jigs

DENVER FORCED FEED Jaw Crushers

Sizes:

(Type "H"— anti-friction bumper bearings, bronze side bearings.)

2¼" x 3½"	8" x 10"
3¼" x 4½"	10" x 16"
5" x 6"	10" x 20"



Denver SRL Pumps

Sizes:

(Type "J"— anti-friction bearing crusher.)

10" x 24"	18" x 36"
10" x 36"	21" x 36"
15" x 24"	21" x 40"
15" x 36"	25" x 40"
18" x 24"	32" x 40"

Denver-Buckman Concentrators

Specifications: Cast steel or fabricated steel frame. Cast steel bumper. 13%-14% Manganese steel jaws and cheek plates. Forced Feed crushing action. Safety toggle of cast iron protects against tramp iron.

Illustrated bulletin sent on request. Write today.

Please write to us about your requirements. Quantity production of standard equipment means lower cost and good deliveries • Complete mill equipment from testing to feeder to dryer.

Denver "Sub-A"— for 25 years the greatest name in **Flotation Engineering.**

Many of our machines are in stock.

Denver Mechanical Gold Pan

FLOTATION ENGINEERS

"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

P.O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • EL PASO • TORONTO • VANCOUVER • MEXICO D.F. • LONDON • JOHANNESBURG

pany has leased the Mountain King plant at Hodson. Sierra, controlled by Roy G. Mead, Glendale, and Ronnie Smith, Dallas, Tex., was recently granted an $8,306 DMPA loan.

COLORADO

★**Silver receipts** at the Denver mint showed a large gain in 1951. Gold receipts for 1951, however, were down to 615,157 oz. worth $21,530,474 from 686,340 oz. worth $24,021,914 in 1950. Receipts of silver totaled 764,408 oz. worth $691,546 compared with 188,116 oz. worth $167,655 in 1950. Number of deposits shipping was up to 2,115 from 1,746.

★**The U. S. Department of Interior** has advised AEC that in accordance with a request from the Commission, it has approved an order (Public Land Order 779) withdrawing from entry and reserving for use of the AEC approximately 91½ sections of public land in Montrose County, Colorado. The Commission plans to drill the reserved area for uranium deposits in the near future. Lands found to contain no uranium will be released from the withdrawal order.

★**Ophir,** one of Colorado's famous mining towns, is to live again. Silver Bell Mines Co. has purchased most of the town's lots; it acquired 194½ of them from Jimmy Noyes alone. The sound of the hammer and saw is ringing out again as carpenters make the houses livable. When spring comes, Silver Bell plans to start 50 new units.

★**Work now under way** at the Vulcan Mine in Gunnison County may reestablish the mine as a leading producer of the area. A crew, under the direction of John Keenan, engineer for the Newmont Exploration Co., Ltd., is exploring the Vulcan.

★**At Cripple Creek,** gold ore worth about $100 a ton has been found on the seventh level of the Isabella mine, according to William Kyner, president of Isabella Mines, Inc. The ore was discovered in the Klondyke vein, host of most of the orebodies in the Isabella. Though the best of it ran $100 a ton, the 40 tons saved should be worth about $17 a ton, according to James Keener, superintendent.

★**At Salida,** the Colorado Western Land Co. has leased, with option to buy, three claims containing feldspar, mica, tantalum, columbium and many other minerals necessary for defense. The claims, in Brown's Canyon, are owned by Pete Moltrer.

★**Troy Wade,** president of the Canyon Gold operations in the Cripple Creek district, reports that a stope is now being developed above the 10th level of the Rubie mine and that samples have been running on an average of 2 oz. of gold per ton.

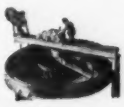
★**F. W. Swerer,** has negotiated a bond and lease on the Faircount group of claims east of Boulder Falls in the Sugar Loaf mining district. A $50,000 development is under way. It will include driving a 700 ft. crosscut to cut a number of tungsten and gold veins, and to open the Pike tunnel and the west portal of Faircount. A group of Ft. Collins investors will finance operations.

★**The Vindicator mine** on Bull Hill at Cripple Creek has produced $27,200,000 in gold since discovery. It will enter a new era for output when the lateral from the Carlton drainage tunnel, several hundred feet below its deepest workings, drains the property at depth. This property is owned by United Gold Mines Co. Alfred Bebee, superintendent of the Vindicator mine, reports that there are now seven sets of lessees operating on the property; several of them are drifting in ore now and the coming weeks should determine the extent and richness of the developments.

★**Leadville Lead Corp.** has awarded a contract to extend its Dauntless tunnel an additional 500 ft. Previously the tunnel had been driven 1,000 ft. to get under old workings. If sufficient ore is indicated, the bore will be extended to within 7 mi. of the Leadville smelter. Ore from the company's property now must be trucked 84 mi. to the smelter. The 500-ft. addition is

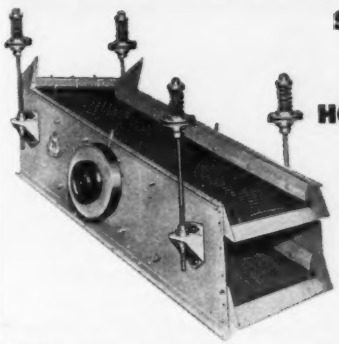
Denver "Sub-A" Flotation

Denver Cross-Flow Classifiers


Denver Hydroclassifiers

Denver Super-Agitator and Conditioners

DENVER-DILLON Vibrating Screens



SAVE UP TO 50% HORSEPOWER

Denver Reagent Feeders

Denver Pulp Distributor

Denver Thickeners

Denver Jaw Crushers

Notice, on Denver-Dillon Vibrating Screens, that bearings are not anchored to heavy channel iron or other supports. Weight of screen and load is suspended. Bearings support only weight of flywheels and shaft. Screen is free of restrictions to impart maximum vibration to entire screen body.

You save on initial cost, too, for this patented action eliminates unnecessary weight and fabricating costs.

Please write to us about your requirements. Quantity production of standard equipment means lower cost and good deliveries • Complete mill equipment from testing to feeder to dryer.

Denver "Sub-A"— for 25 years the greatest name in **Flotation Engineering.**

Many of our machines are in stock.

FLOTATION ENGINEERS

"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

P.O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • EL PASO • TORONTO • VANCOUVER • MEXICO D.F. • LONDON • JOHANNESBURG

Colorado *(Continued)*

expected to cut southern extensions of the Lynn and Stewart vein systems. Another 700 ft., the next phase, should put the heading under the Hilltop and Last Chance workings.

★**At Cripple Creek,** a new and much more attractive royalty system for leasing on Golden Cycle properties was announced by Max Bowen, vice president and general manager. Mr. Bowen said the reduction in royalties was agreed upon as an incentive to create more interest in leasing in the Gold Camp area. The new setup starts with a 7½% royalty on ore up to $17.50 a ton. Under the old rates, $17.50-ore would have been assessed 17%. Gold ore worth from $17.50 to $35 will be assessed 12½%, down from 25%. Since a large amount of the ore mined in the area is $35 a ton or less, the savings to leasing operations will be substantial.

★**Stratton Cripple Creek Mining & Development Co.** is looking forward to improvement in the general situation of gold mining during 1952. Interest in Cripple Creek mines has been increasing and there is much to suggest that many idle mines will reopen during 1952. During the past year the company's Chicago tunnel was rehabilitated by Globe Hill Mining Co., which holds the lease on the Proper mine.

★**An orebody of good grade** has been opened on the 21st level of the Cresson Mine, says Superintendent Wesley Moulton. The vein has been drifted on for about 25 ft., with values continuing in the heading. Width has not been determined.

★**Gold Chief Mines,** 5 mi. northwest of Central City, promises to be a large producer in 1952. The mill is ready to go. A recently completed winze developed a 4-ft. vein of fairly high grade free-milling ore in granite. Officers are Maude W. Russell, president and general manager; Oren J. Worley, vice president; W .H. Werner, secretary-treasurer; and Charles O. Westerman, superintendent.

★**Reynolds Mining Corp.** recently bought the Poncha Springs fluorspar mine from Fluorspar, Inc. The property consisted, at the time of purchase, of 90 acres, 22 mining claims, and a partially completed flotation plant which Reynolds has since completed.

IDAHO

★**Jack Waite Mining Co.,** operated by American Smelting and Refining Co. under a long-term lease and profit-sharing agreement, recently announced a dividend payable to stockholders of record March 15. Total dividends to date for the company are reported to be $110,176. The Jack Waite property is in the Murray district and is the only mine in the Coeur d'Alenes that started work in Idaho and extended into Montana. The Idaho-Montana line runs through the property, crossing it at about the center of the orebody.

★**At the Morning Mine** at Mullan, Federal Mining and Smelting Co. is driving westerly on the You Like vein into the Hickory claim at the 600 or No. 5 tunnel level of Morning Mine. The company recently deepened the Morning shaft and has completed development of the 5,000 level. The 3,600-ft. level is being extended eastward to explore the Independence Mining Co. property adjoining Federal ground. This level has reached a point about 1,000 ft. east of the Morning shaft and will be advanced several thousand feet into the Independence property where crosscutting and diamond drilling will explore the mineral zone.

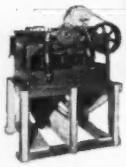
★**American Smelting and Refining Co.** jointly with Day Mines, Inc., has entered into a long-term lease-and-profit-sharing agreement with Sterling Mining Co. providing for exploration of this company's property in the east end of the silver section of the Coeur d'Alenes. An easement secured by Day Mines on the Rainbow Tunnel will permit exploration of the Ster-

Denver-Dillon Vibrating Screens

Denver Ore Feeders

Denver Jaw Crushers

Denver Disc Filters

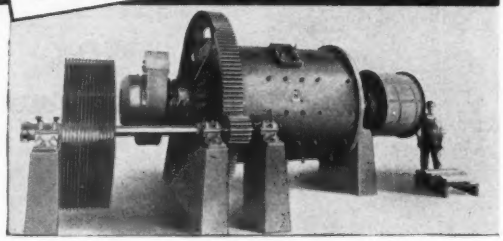

Denver Selective Mineral Jigs

Denver SRL Pumps

Denver-Buckman Concentrators

Denver Mechanical Gold Pan

DENVER the Ball Mill with STEEL HEADS



What happens when a Ball Mill head breaks? Mill men know that replacement cost is small *compared to losses caused by mill shutdown!*

Steel heads on DENVER BALL MILLS put *strength* where it is needed. Repeat orders from mills all over the world prove dependability of Denver Steel Head Ball Mills. A Denver Steel Head has never failed!

SIZES: Diameters of 12" - 16" - 24" - 30" - 36" - 48" - 60" and 72" in lengths up to 12 feet.

We can give you good deliveries

Please write to us about your requirements. Quantity production of standard DECO equipment means lower cost and good deliveries.

Complete mill equipment from testing...to feeder...to dryer.

DENVER "SUB-A" FLOTATION —for 25 years the greatest name in Flotation Engineering.

FLOTATION ENGINEERS

"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

P.O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • EL PASO • TORONTO • VANCOUVER • MEXICO CITY • LONDON • JOHANNESBURG

ling group and of the Triangle Claims which are owned jointly by Day Mines and American Smelting and Refining Co., from this adit level.

★**Henry T. Mudd,** vice president of Cyprus Mines Corp., visited the Coeur d'Alene district to confer with the local staff in charge of development work on Silver Banner and Cortez Silver-Lead holdings in the eastern end of the district, near Mullan. Both companies are subsidiaries of Coronado Copper & Zinc Co., which is also owned by Cyprus. The company has acquired 2900 acres of mining ground in the Coeur d'Alene district, all of which is on the south side of the Osburn fault in the new silver belt extending from the Sunshine mine, near Kellogg, into Mineral County, Mont.

Silver Banner's property embraces the Moe and Gem State properties just west of Mullan and adjoining Hecla's Rock Creek group, while Cortez Silver-Lead's holdings consist of a large group of undeveloped mining claims east of Mullan and adjoining the Atlas property now undergoing deep development by Hecla, Newmont, New Jersey Zinc, and Atlas in a combined operation.

★**Dr. H. C. Mowery,** president of the Coeur d'Alene Mines, announces that the company has completed a third diamond drill from the 2800 to the 3000 level at a considerable distance from two other holes, coring 8½ ft. of ore averaging 22 oz. of silver and a small amount of copper. He stated that 2 ft. of the core was solid high-grade. As a result of the favorable showings in the three holes, the company is now sinking a winze from the 2800 to 3000 level.

★**Lucky Friday Silver-Lead,** just east of Mullan city limits, has completed milling 8000 tons of ore at the Golconda custom mill. It netted the company 17 carloads of lead concentrates and two cars of zinc concentrates which, according to returns from the first five carloads, netted $13,700 per car.

★**Hecla Mining Co.** has purchased the Banner-Idaho group of claims on Boulder Creek adjoining the Atlas, now under deep development by Hecla, Newmont, New Jersey Zinc, and Atlas. Hecla agrees to purchase 70,000 shares of previously unissued Banner-Idaho stock at 10¢ per share and has also obtained a six-year option on 247,500 of the remaining unissued shares at 10¢. Hecla will develop the ground not later than 1956 after completing the Atlas shaft. The old Banner Co. had surrendered its state charter several years ago and was recently reorganized under the name of Banner-Idaho. It issued 1,182,750 shares of stock to be distributed share for share to stockholders of the old company. Hecla will receive 65% of the production profits and Banner-Idaho, 35%.

★**Sidney Mining Co.** on Pine Creek made a profit of $1,878,972 in 1951, according to company officials. Sidney's orebody is virgin from the lower levels to the surface and has a developed length in excess of 1,000 ft. The company is now sinking and developing the vein below the Rainbow level.

★**Spokane-Idaho mine** (formerly Constitution) at the head of the east fork of Pine Creek, has greatly increased its hoisting capacity, according to J. C. Kieffer, general manager. The new hoist is now awaiting control equipment. It is designed to hoist at 1,000 fpm with counterbalanced skips each handling 3 tons of ore. The old hoist handled only 2 tons of ore per trip, traveled at only 700 fpm, and was a major bottleneck.

★**Snowslide conditions** have temporarily halted work at the Sun Valley Lead-Silver Mines at Ketchum, Idaho, according to Ross Roundy, president and manager.

ILLINOIS

★**Ozark-Mahoning Co.,** of Rosiclare, Ill., has begun a diamond-drilling program, which will extend over a period of a few months, on two Hardin County properties. Drilling is under

Denver "Sub-A" Flotation

Denver Cross-Flow Classifiers

Denver Hydroclassifiers

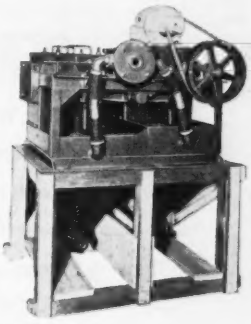
Denver Super-Agitator and Conditioners

DENVER Mineral Jigs

Recover Your Minerals as soon as Free

Denver Reagent Feeders

Gravity concentration *in grinding circuits* is now possible. Denver Selective Mineral Jigs treat an unclassified feed and recover minerals as soon as free and at a coarse size.



Denver Pulp Distributor

Prove to yourself the advantages of recovering mineral as soon as free *and before you grind it*--- out of it! Send a 100 pound sample of ball-mill feed and $30.00 to: Denver Ore Testing Laboratory, Denver 17, Colorado. Please sketch present flowsheet and give tonnage. Products of Denver Jig Test will be returned to you for assay. If you are not satisfied there will be no charge. You are the judge.

Tests of this nature have discovered amazing recoveries that reduced over-all milling costs.

Denver Thickeners

Won't you please write to us about your milling problems? We have had 25 year's experience in milling equipment from testing to feeder to dryer.

Denver Steel-Head Ball Mills

Many of our machines are in stock

FLOTATION ENGINEERS

"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

P.O. BOX 5268 • DENVER 17, COLORADO

DENVER • NEW YORK CITY • CHICAGO • EL PASO • TORONTO • VANCOUVER • MEXICO CITY • LONDON • JOHANNESBURG

Illinois (*Continued*)

way on the E. M. Stotlar property, ½ mi. southwest of the Crystal Fluorspar Co.'s Jefferson mine, and at the Rose Creek mine, owned by S. C. Yingling, of Evansville, Ind.

★**Rock Creek Mining Co.**, newly organized, has leased one "Forty" of its 740-acre Hardin County tract to Prentice Oxford and Harold Patton, of Cave-in-Rock, who are moving in equipment preparatory to development. Carl Embree, of Elizabethtown, and Amos Hill and Lowell Oxford, of Cave-in-Rock, organized Rock Creek Co.

KENTUCKY

★**Penn Salt Manufacturing Co.** recently acquired two fluorspar mills in the Kentucky mining district: 1) R. N. Frazer, of Marion, vice president of Kentucky Fluorspar Co., purchased from the RFC the Marion mill formerly operated by Minerals Flotation Corp., known as the "Bertelson Mill," and leased it to Penn Salt. 2) The C. and L. mill, near Mexico, Ky., formerly operated by Herbert Crider and Cecil A. Lennon, was purchased by Penn Salt, which also contracted for a C. and L. tailings pile estimated at 60,000 to 75,000 tons.

★**After being shut down for several years,** the Nancy Hanks fluorspar mine, near Salem, Ky., one of the oldest and most productive properties in the fluorspar district, has been reopened by S. D. Loyd and Allen Tinsley, Marion operators, who leased it from its owner, the Croft estate.

MICHIGAN

★**Since Quincy Mining Co.** started its reclamation plant at Torch Lake in November, 1943, it has recovered over 20,000 tons of copper from the old lake-bed tailings resulting from many years of former mine operation. In 1950, out of a total of 1,006,355 tons of tailings treated, the recovery was 5,946,545 lb. of refined copper, or 5.91 lb. of copper per ton.

★**E. J. Longyear Co. has been drilling** for some time in the Fortune Lake area near Crystal Falls for Pickands, Mather & Co. More than 15 holes have been put down in the area where the overburden runs about 90 ft. If quantity and quality of the ore found justifies it, this could be an open pit operation.

★**OPS has authorized** the timber producers in the Iron River area to increase their prices for mine timber by 35% above the highest prices they had charged for mine timber from May 24 to June 24, 1950. This was made necessary because timber operators were turning to pulpwood.

★**North Range Mining Co.** shipped 559,548 tons of iron ore during the 1951 ore season.

★**A short unauthorized strike** occurred at the Homer mine of the M. A. Hanna Co. in mid-January. It was due to what the local grievance committee called a breach of seniority rules when two miners, whose stope had been worked out, were transferred to another stope. The grievance committee claimed that this new working place was a "promotion" because, they said, it offered an opportunity for considerably higher earnings than had the old stope. Company officials, however, replied that the transfer was a routine action and that the new place was less desirable than the one the two men had left. The union voted to return to work and to submit a seniority program to the management.

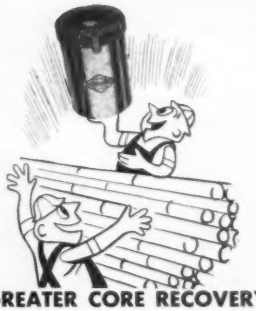
★**Michigan Water Resources Commission** predicts that Great Lakes levels, already so high as to cause a considerable amount of erosion on Michigan's extensive lake coastline, will go even higher next year.

★**The overturning-belt conveyor system** on the stockpile at Cleveland-Cliffs' Mather mine is working satisfactorily. It is believed to be the only such system in operation in the Lake Superior area. By an ingenious arrangement of pulleys, the belt is turned over after having discharged

CHRISTENSEN
Diamond Products Co.

means...

FASTER PENETRATION



GREATER CORE RECOVERY

PERFORMANCE

The Trade Mark of Christensen Diamond Products Co. is recognized the world over for quality performance . . . less cost per foot.

LESS COST PER FOOT

WRITE TODAY: for our recently completed Mining Catalog.

NAME .....
ADDRESS .....
CITY .....
STATE .....

1937 SO. 2nd WEST, SALT LAKE CITY, UTAH

its load, so that the clean side of the belt is on top of the rollers on its return trip. The belt is again turned before being reloaded so that the load is always on same side of belt. This reversing process keeps ore which sticks to the belt from dropping on the rollers and bearings.

★**Because of the heavy shipments** from Escanaba ore docks in 1951, more than the usual amount of dock repairs are necessary this winter. Pocket linings are worn and, with other repairs, about 670,000 fbm of timber are required. A busy season is anticipated for 1952.

★**M. A. Hanna Co.** mines of the Iron River district forwarded a total of almost 2 million tons. In first place was the Homer-Wauseca with 1,167,425 tons. The Buck-Zimmerman group was second with 638,481 tons while the Hiawatha was next with 583,706 tons.

★**Natural gas may be brought** into the Upper Peninsula and the Michigan copper district from Canada. The Michigan Economic Development Commission has decided to take the initiative in this project. A Canadian gas company has proposed to build a pipe line along the north shore of Lake Superior, and the Commission has voted to make every effort to have the pipe line rerouted along the southern shore. The change would give the Upper Peninsula a new industrial advantage.

Endicott R. Lovell, president of Calumet & Hecla Consolidated, said availability of natural gas would help copper production: "If this pipe line were put into the Upper Peninsula and we were able to obtain natural gas," he said, "Calumet & Hecla could operate marginal mines which cannot now be utilized economically. This development would mean the beginning of a new day in the Michigan copper industry."

★**Eventual resumption of mining** on the famed Calumet conglomerate lode of Calumet & Hecla is involved in an application for financial assistance from the government to help dewater the conglomerate workings. This great orebody produced over 3-billion lb. of copper from 1865 to 1939, when operations were suspended.

MINNESOTA

★**St. James mine at Aurora,** operated by Oglebay, Norton & Co., is scheduled to start shipping ore in 1952. The St. James is a former underground mine which had shipped 2,680,830 tons between 1916 and 1924.

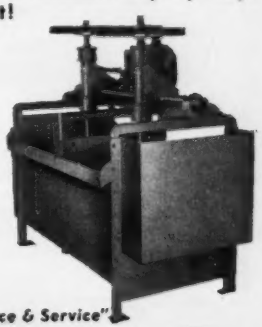
★**The M. A. Hanna Co.** shipped a total of 13,677,204 tons from its Lake Superior area mines in 1951. Of this 9,491,518 tons was from the Mesabi Range. Shipments came from five

High recovery at minimum cost of operation is the goal of millmen and field engineers in every industry faced with a problem of concentrating values. That's why—in every part of the industrial world—the most exacting of them are using AGITAIR—the machine famed for simple and easy adaptability to varying flotation demands. For example, simple changes in impeller characteristics readily adapt AGITAIR Flotation to rougher, cleaner or scavenger circuits. Variable impeller speeds and manipulation of the air volume to individual cells provide the flexibility that streamlines and stabilizes day by day production. That spells p-r-o-f-i-t!

Fully illustrated literature will be mailed on your request.

•

Your correspondence on special problems will be promptly answered.



"Leaders in Experience & Service"

THE GALIGHER CO.

METALLURGICAL DIVISION · ENGINEERING SERVICE

CONSULTATION • ORE TESTING
PLANT DESIGN • CONSTRUCTION

HOME OFFICE
545 West 8th South
Salt Lake City, Utah
P. O. Box 209

EASTERN OFFICE
921 Bergen Avenue
Jersey City
New Jersey

Agents In All Principal Foreign Mining Districts

Representing, GENERAL ENGINEERING CO. of CANADA, Ltd., U. S. A., MEXICO, SOUTH AMERICA

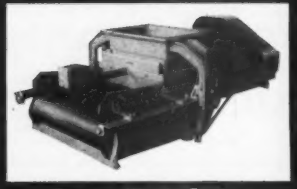
IF

FEEDING

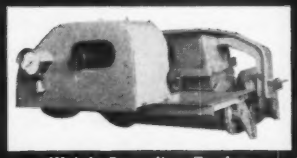
IS YOUR PROBLEM

THEN CHECK THESE

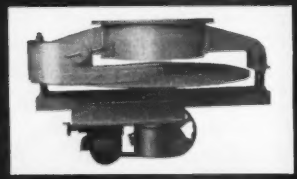
HARDINGE FEEDERS



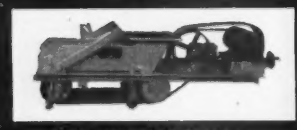
Constant-Weight Feeders



Weight-Recording Feeders



Disc Feeders



Volumetric Belt Feeders

CONSTANT-WEIGHT FEEDERS regulate the feeding of materials at a **constant-weight** rate, rather than a constant-volume rate. The feeder automatically compensates for changes in specific gravity and bulking, due to moisture, which would cause irregular feeding.

WEIGHT-RECORDING FEEDERS keep a record of the amount of material fed. Feeder is the constant-weight type equipped with recorder.

DISC FEEDERS are ideal for handling hot, sticky, or bulky materials without bridging or clogging.

VOLUMETRIC BELT FEEDERS are designed for simultaneous conveying and volumetric feed control.

COMPLETE DATA on Hardinge Feeders available in Bulletin 33-D-1. Get your copy today.

See Opposite Page for Addresses of District Offices

H A R D I N G E

See opposite page for Addresses of Branch Offices.

Minnesota *(Continued)*

of the area's ranges (none from the Vermillion Range) and from Spring Valley in southern Minnesota (452,235, all rail). South Agnew was the No. 1 Mesabi Range shipper with 1,364,162 tons. The Bray was second at 879,258 tons.

★**Snyder Mining Co.'s** 1951 shipments amounted to 1,017,224 tons, of which the Webb at Hibbing contributed 615,567 tons. The Shenango, which has shipped over 17-million tons since it was opened up in 1904, produced 115,210 tons.

★**R. T. Elstad**, president of the Oliver Iron Mining Division, reviewing the outlook for 1952, said that about 86-million tons of waste material will be removed; the taconite concentration plant at Mt. Iron is expected to be completed during the year and a washing plant for the Hull-Rust mine at Hibbing will go into service. The lean ore from the Hull-Rust pit has formerly been shipped to Oliver's Trout Lake plant at Coleraine.

★**Zontelli Brothers** have begun stripping a new property on the Cuyuna Range near Crosby. It will be known as the Manuel mine and includes part of M. A. Hanna Co.'s Yawkey mine. A washing plant will be erected at the property.

★**Jones & Laughlin Steel Corp.** has dissolved the Inter-State Iron Co., a subsidiary which formerly operated its Minnesota mines. In the future it will be known as the Minnesota Ore Division of Jones & Laughlin Steel Corp. Headquarters will continue to be at Virginia with Grover E. LeVeque as manager and H. F. Kullberg as general superintendent.

★**Southwestern Engineering Co.'s** Industrial Division has opened an engineering office in Hibbing. Herbert V. Hughes, manager of the Industrial Division, will be in charge of the office until it is well organized. He will be assisted by William Chase, assistant chief engineer of the division, F. C. Blickensderfer, engineering consultant, and Jack Donoghue, designer. They will specialize in design and construction of beneficiating plants.

★**DPA has announced** that accelerated tax amortization certificates of necessity were granted to the Coons-Pacific Co. of Hibbing, $560,300, and the Republic Steel Corp. for its Mesabi mines, $405,000.

★**The Virginia open-pit mine**, which was operated by the Snyder Mining Co. until the end of the 1951 season, has been taken over by Skubic Bros. of Virginia.

★**Reserve Mining Co.**; the Oliver Iron Mining Division; Pickands, Mather & Co.; and Cleveland Cliffs Iron Co. with the Ford Motor Co. (the latter in Michigan) all plan to mine and concentrate taconite on a commercial scale. Predictions are made that, by

1960, 20-million tons of taconite concentrates per year will be produced, with 40-million tons annually by 1970.

★**Great Northern R. R.** has 700 ore cars on order for next season and 25 diesel electric locomotives together with box cars, gondolas and other equipment totaling $27-million.

★**M. A. Hanna Co.** will install a dense-media unit at the Mesabi Chief mine at Keewatin this winter.

★**Remodeling and renovation** which will cost more than $2-million is planned for the Duluth-Superior and Two Harbors ore docks this winter. The Duluth, Missaba & Iron Range, Great Northern and Northern Pacific railroads will all have a part in the program. About three-quarters of the total estimated expenditure will be by the D.M.&I.R. in remodeling its No. 1 dock at Two Harbors. Changes there will facilitate the loading of new and larger ore carriers now being constructed. Some of these new vessels are expected to be in service next season. Improvements planned at No. 1 dock include widening of pocket doors from 5′ to 11′, eliminating present restricting corners; longer and wider spouts and new and heavier machinery to handle doors and spouts. The contemplated changes are expected to make No. 1 the fastest loading dock on the Great Lakes.

The Great Northern and Northern Pacific railroads will carry on repairs and improvements at their Allouez docks. Next season, too, the Great Northern will use diesel train engines for switching at Allouez and on the docks. It will also have more diesels on the long haul from mines to docks. Two Gantry cranes will be erected with a "shaker" attached to loosen wet or sticky ore from cars and into the pockets. All the improvements are designed to expedite the transfer of ore from ore cars to pockets and to ore boats.

MONTANA

★**Amador Mine**, near Superior in Mineral County, has reopened. The property is a vein deposit of copper and silver.

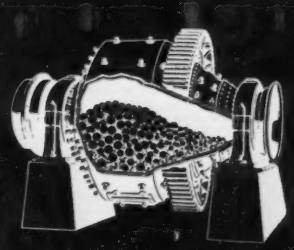
★**AEC has moved** its Spokane headquarters to Salt Lake City and at the same time has opened a branch office at Butte, Mont. E. E. Thurlow, chief of the former AEC Spokane office, will occupy the same position at the Salt Lake office and Millard L. Reyner, formerly of the Spokane office, will be in charge of the Butte headquarters.

★**The first major export** of Alberta natural gas started Feb. 7 when gas pushed through the $3.5-million, 75 mi. pipe line from Pakowki field southeast of Lethbridge to ACM Co.'s plants at Great Falls, Anaconda and Butte.

The pipe line runs from near Fore-

IF
FEED CONTROL

IS YOUR PROBLEM
THEN INVESTIGATE
HARDINGE
ELECTRIC EAR®



Hardinge Conical Mill

"Electric Ear"

Constant-Weight Feeder

To keep your **GRINDING MILLS** (upper right) operating at peak efficiency at all times, Hardinge has developed the "Electric Ear" (center right), a unique feed control that regulates the feed rate by listening to the sound of the rotating load.

The **"ELECTRIC EAR"** compensates for changes in hardness and size of feed and enables you to produce a more uniform oversize. It increases mill efficiency 8 to 20% * and frees the operator for other duties.

A perfect grinding team is the Hardinge "Electric Ear" controlling the operating rate of the Hardinge **CONSTANT-WEIGHT FEEDER** (lower right) which regulates feeding materials by weight instead of volume

Write for Bulletin 42-1 today.

*** These figures are based upon several hundred tested units.**

HARDINGE
COMPANY, INCORPORATED
YORK, PENNSYLVANIA—240 Arch St. Main Office and Works
NEW YORK 17 • SAN FRANCISCO 11 • CHICAGO 6 • HIBBING, MINN. • TORONTO 1
122 E. 42nd St. 24 California St. 205 W. Wacker Dr. 2016 First Ave. 200 Bay St.

ATLAS

TYPE "K"

Storage Battery

LOCOMOTIVES

EQUIPPED
With Atlas
Double-Reduction
Spur Gear Drive

Anti-Friction
Bearings

Special equipment or design to meet local mine conditions can be furnished.

Write for catalog today.

ATLAS ENGINEERING SERVICE—IS ALWAYS AT YOUR SERVICE

Canadian Representatives
Mine Equipment Co.
Kirkland Lake, Ont.

International Agents &
Machinery Co. Ltd.
Vancouver, B. C.

Universal Mechanisation Company (Pty.) Ltd
7, Kruis Street
Johannesburg, South Africa

Complete details and specifications on request.

THE ATLAS CAR & MFG. CO.

Smelting on Site

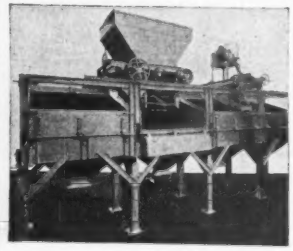
with

MACE Furnaces

and

Sintering Hearths

Saves high transportation and treatment charges on your ores and concentrates.



Wire or write for new catalog.

Standard sizes 5 to 250 tons capacity. Working scale tests on ton lots or larger made at our Denver Smelter. Send us an analysis for preliminary report.

The Mace Company

FIRE CONCENTRATION METALLURGISTS

2763 BLAKE STREET, DENVER 5, COLO., U.S.A.

Montana *(Continued)*

most, Alta., to Shelby, Mont. where it joins the lines of Montana Power Co., supplier to Anaconda. Export was started after authorization by the U. S. Federal Power Commission. The order was signed Feb. 2 by President Truman, and the final order was issued Feb. 7 by the Ottawa Board of Transport Commissioners.

Export was allowed by a special act of the Alberta Legislature for a five-year period only, and for defense work only. The pipe line was completed in December, and export had been held up pending United States approval.

★**Caledonia Silver-Lead Mining Co.** (home office, Kellogg, Idaho) has contracted with a Los Angeles firm to process and market kaolin from a recently acquired deposit near Lewistown. The company has exposed several acres of the clay, and, from tunneling it has done, estimates the thickness at up to 30 ft. The deposit is estimated at 5,000 to 10,000 tons of commercial clay.

★**Madison County Mining Association,** a chapter of the Mining Association of Montana, held its annual meeting and dinner in Virginia City on Dec. 8. Speakers were Dr. J. R. Van Pelt, Butte, president of the Montana School of Mines and director of the Montana Bureau of Mines and Geology, and Carl J. Trauerman, Butte, secretary-manager of the Mining Association of Montana. Officers elected for the ensuing year were Mrs. Camilla Gage, Twin Bridges, owner of the Emma and other mines, president; James A. Johnson, Alder, producer of onyx building stone, vice president; R. B. Vickers, Virginia City, treasurer; and J. R. Vickers, Virginia City, secretary. According to oldtimers, Mrs. Gage has the honor of being the first woman to head a mining association in Montana.

NEVADA

★**Black Rock Desert Mineral Co.** is reportedly milling 40 tons of sulphur daily at its Sulphur property near Winnemucca. Company holds 1,100 acres of patented mineral land in this area, reported to contain 5-million tons averaging 20% to 35% sulphur. Mining is by open pit.

★**Victory Divide Mining Co.** has acquired a lease and option to purchase seven fluorspar mining claims 100 mi. east of Fallon. Contract includes a $45,000 payment from production royalties. The claims are reported to contain commercial deposits of fluorspar in veins from 3 to 8-ft. wide, some of which may be mined by surface operation.

★**Combined Metals Reduction Co.** has announced plans for 1952 which call for production of manganese, and an increase in the output of lead and

zinc. Plant additions will include construction of a unit at Pioche to concentrate oxidized ores, and erection of an electrolytic refinery at Henderson. The company currently employs 350 men and expects to add 100 to its pay roll during the year.

★**Construction of a mill and smelter** is under way at the Bonnie Clare lead and silver property 30 mi. south of Goldfield. Lippincott Lead Co., headed by George Lippincott, Santa Ana, is doing the work. Announced cost of the project is $250,000 and it is expected to include selective flotation and a smelter to reduce lead-silver concentrates and lead ore into bullion form. The company also plans to construct housing facilities at Bonnie Clare. Present buildings have already been improved, and a diesel power plant and pump have been installed. The property, in production for the last 12 years, has been shipping its ore to Salt Lake City or San Francisco for smelting. Present production of 20 tons of ore daily is being stockpiled.

★**Development of scheelite properties** in the Sand Springs district east of Fallon is being carried out by Harry Howard, of Churchill County, and by Robert E. Stewart, Reno, and his associates. Mr. Howard has purchased a large scheelite deposit in the area from the Robert W. Smith estate. The Stewart interests have announced tentative plans to install a concentration plant, having purchased property adjoining that being developed by Mr. Howard.

★**Tungsten Carbide Co.** has expanded operations at the Nevada Tungsten property east of Rawhide. The firm, which is a subsidiary of Kennametals, Inc., of Latrobe, Penna., obtained control of the property last spring from the Nevada Scheelite Co., Los Angeles, Calif. Included in the transaction was a concentration plant at Deadhorse Wells. Nevada Tungsten has been an important producer of good ore for several years. Industrial Mines, Inc. has completed exploration at the Strand-Sheehy mine which is near Nevada Tungsten, and is planning development of the property early this spring. J. A. Madison is in charge for Industrial Mines, Inc.

★**Kennecott Copper Corp.**, operating its Liberty pit at Ruth and the concentrator at McGill at full speed, is processing about 20,000 tons of copper ore daily. Preparations are under way for early production from the company's Hidden Treasure property near Kimberley.

At the firm's Deep Ruth project, equipment has been moved from the Monitor, Star Pointer, and other old shafts to the 775-ft. Kellinske Shaft. This shaft will be enlarged before it is sunk to the 2,245-ft. level. Reserves are an estimated 22.5-million tons of ore about 900 ft. below the Ruth open pit.

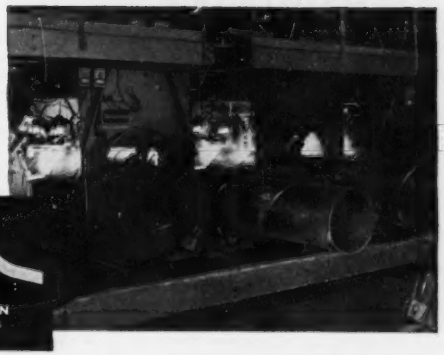
★**Recent fire damage** at the King of

How NAYLOR Light-weight Pipe is built to take it

Here is the picture story of how Naylor creates a light-weight pipe for heavy-duty service.

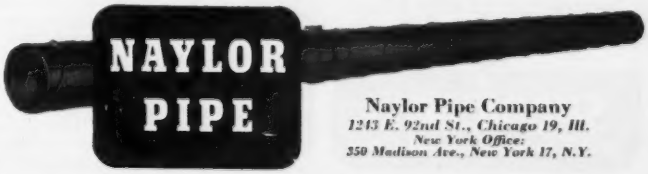
In this operation, the Naylor pipe machine forms sheet into a spiral, lock-seamed pipe. This process creates a structure that is pipe before it is welded. As shown in the sketch of a lateral section before welding, the lockseam carries the structural load.

Illustrated here is the Naylor automatic welding process which welds the lock-seamed spiral to the wall of the pipe. This step provides a positive seal as shown in the lateral-section sketch after welding.

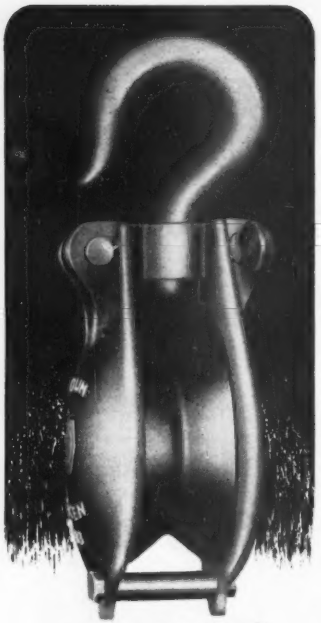


Because the lockseam carries the load and the weld is relieved of any strain, Naylor pipe provides the practical answer for lines that must stand up in rugged service in the mining field.

Write for Bulletin No. 507



Naylor Pipe Company
1243 E. 92nd St., Chicago 19, Ill.
New York Office:
350 Madison Ave., New York 17, N.Y.



WHY...

WE HAVEN'T ADVERTISED THIS

SKOOKUM SLUSHER BLOCK

The Skookum 708S block *(pictured above)* has been in production for six months. Yet, this is the first announcement.

WHY? Because an enthusiastic salesman told several customers about this block while it was in design. Those customers took everything we could produce.

The exceptional broad throat of this block passes knotted lines. Equipped with special alloy sheave and sides, the 708S can be picked up by magnets should it ever find its way into a load of ore.

Holds 4½ times more grease than comparable blocks. Patented Skookum grease seal guards roller bearings from moisture and dust. Accommodates ⅜ and ½ inch lines. Maximum weight 36 pounds.

Built specifically for slusher mining.

SKOOKUM CO. INC.
8504 N. Crawford, Portland 3, Ore.

Nevada *(Continued)*

Tonopah mine has been repaired and a new timber framing building has been constructed to replace the one destroyed in the blaze. Percy Dobson and his crew have repaired the shaft, and are now at work extending the drift. The shaft is equipped with a cross head, and muck hoisting is done with a bucket. In developing the property Mr. Dobson found timbering installed by previous owners was good all the way down to 300 ft. and the only major replacements necessary were shaft guides and manway ladders.

★**L. T. Johnson Construction Co.,** Ogden, Utah, has been awarded a $48,420 contract by the Nevada Highways Department for building 40 mi. of federal mine-access road from the Lincoln Tungsten mine in Lincoln County to a point near Crystal Spring.

★**Mining is now under way** at Lead King Mines, Inc., property 16 mi. north of Las Vegas. Preliminary work has been in progress since last summer, and a 30-ft. headframe and hoist have been installed. Mine workings consist of a main shaft sunk to the 200-ft. level with a sub-surface level at 30-ft. An ore shoot extending 50 ft. has been exposed in addition to several drifts and tunnels leading out from the main shaft. The ore shoot is said to have a width of from 4 to 20 ft. with values ranging from 3 to 15% lead. The mine employs 15 persons. Officers are James H. McCarthy, Richard L. Neville and Herschell G. Conley.

★**Noonday mine** on Battle Creek southwest of Wells is expected to begin production soon. John B. White, head of Noonday Mines, Ltd., says the property has much tonnage in sight and promises to be a large producer of lead, silver and zinc. Fred H. Crosby is general manager of the property.

★**Development work** has begun at the Batholite group of 11 tungsten claims in Copper Basin, Elko County. Tim Spencer and associates have acquired control of the property, and plan to install a concentration plant early in the spring.

★**Veins of scheelite ore** varying in width from six to 25 ft. are reported in the Knowles Montrose mining property in the Alder district east of Mountain City. The Montrose Mining Co., Knowles-Montrose interests, Jack Mink and others are developing the property in an area 2 mi. wide and 3 mi. long.

★**D. F. Dunnigan,** owner and operator of the Red Rock quicksilver mine in Fish Lake Valley has announced plans for a development program under terms of a contract with the DMPA. Surface work by bulldozer will be done preparatory to diamond drilling. The exploratory program will be in virgin ground comprising two blocks of the property. The older workings were not included in the government participation program. Present development on the property consists of 5,000 ft. of tunnels and 300 ft. of shaft and winze work. The mine site is at 7,400 ft. elevation, and operations are hampered by winter weather.

★**Moving of a 100-ton custom mill** from Hailey, Idaho, to Lackawanna on the outskirts of Ely is assured as the result of a contract between the City of Ely and Baltimore-Camas Mines, Inc. A lease has been signed granting a 10-acre mill site and 10 additional acres for a tailing pond. Baltimore-Camas, Inc., is now working tungsten property at Cherry Creek and at Trout Creek in Utah. The acquisition of the mill for the Ely area is the result of a campaign headed by the White Pine Chamber of Commerce to establish such a mill in that area to promote tungsten mining in eastern Nevada. The mill, which is scheduled to be moved and set up before spring, is reported to have a value of $500,000. It will be operated on a custom basis by Baltimore-Camas.

NEW MEXICO

★**New Mexico Mining Association** went on record at its annual convention at Carlsbad, Jan. 17-19, against national deficit spending and urged that the U. S. return to the gold standard. Another resolution urged expansion of the New Mexico Institute of Mining and Technology. Better access roads and mine-to-market roads were asked of the state.

John A. Wood, of Chapman & Wood, mining engineers and geologists, Albuquerque, was elected president of the NMMA; W. Page Morris, general manager of Duval Sulphur & Potash Co., Carlsbad, first vice president; Ira L. Wright, geologist, Silver City, second vice president; Dwight H. Plackard, of Albuquerque, was re-elected secretary-treasurer.

Newly elected directors: T. M. Cramer, retiring president, vice president of the United States Potash Co., Carlsbad; Donald Purvis, of Vanadium; C. S. Elayer, od Silver City; G. T. Harley, manager Potash, International Minerals & Chemical Corp., Carlsbad; F. S. Stewart, general manager, Southwest Potash Co., Carlsbad.

★**York Mining Co.,** Albuquerque, plans to construct a flotation mill at Socorro, for the recovery of copper, zinc, lead, silver and gold. Grover C. York, Albuquerque, is president.

★**The U. S. Bureau of Mines office** in Silver City was to be closed March 1. John Soule, engineer in charge, announced that New Mexico will be served by the Bureau's office at Tucson from now on.

★**The historic San Pedro mine,** 40 mi. northeast of Albuquerque, has been granted an $83,700 loan for copper exploration work. Col. C. F. Williams, co-owner of the mine, said the work would take about one year. During

World War II the mine was operated by the John J. Raskob interests. It is estimated that a total of $15-million worth of copper, gold and silver has been taken out of San Pedro since 1832, when the Spaniards mined it.

★**AEC has signed** a contract to buy uranium concentrates from a processing plant to be built by Anaconda Copper Mining Co. in the vicinity of Grants. This is about midway between extensive deposits of uranium-bearing ores recently discovered on Santa Fe Railroad property at Haystack Mountain, north of Prewitt, and other deposits found in the Laguna Indian reservation. Anaconda did exploration work in both areas. The plant is expected to operate by April 1953.

★**Navajo Uranium Co.**, Cortez, Colo., is reported to be negotiating with the Atomic Energy Commission for the construction of a $2,750,000 uranium ore processing plant at Shiprock. This new company, which recently built an ore sampling and purchasing depot at Shiprock and leased it to the AEC, was formed by R. O. Dulaney, Jr., Albuquerque, and Ed Key, Marshall, Tex. They bought claims (covering 1,280 acres) in the Lukachukai Mountains on the Navajo reservation from F. A. Sitton, Inc., Dove Creek, Colo. Navajo Uranium and F. A. Sitton are among the largest independent operators in the Colorado Plateau.

At present all companies mining on Indian lands must have the claims filed by Indians. Navajo Tribal Council has now approved a new regulation which will make such enterprise more inviting to non-Indians. The regulation waits only final approval of the Bureau of Indian Affairs.

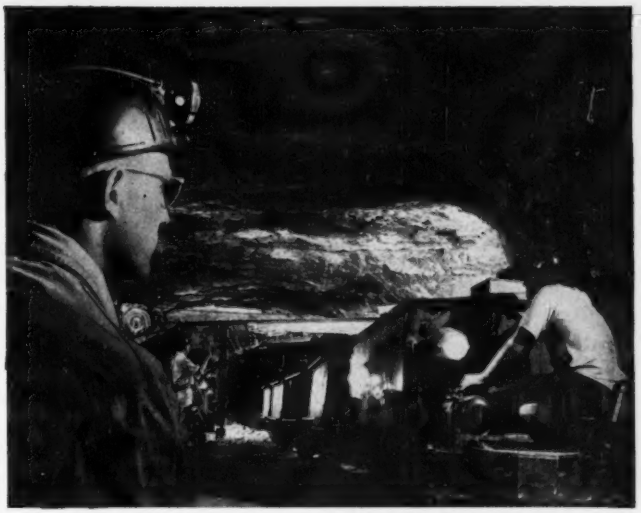
★New Mexico mines produced $92,490,895 worth of ores in the fiscal year ending June 30, 1951, according to the annual report of John A. Garcia, state mine inspector. Metal production accounted for $52,647,076 of the total. In this category, copper led with $35,809,525. Zinc production was valued at $13,273,709.

Potash, with production amounting to $32,074,677, monopolized non-metallic values, which totaled $35,603,417. Coal production, not included in the above figures, totaled $4,240,402 for the year.

Mining activity has been mounting since the start of the Korean war, and is expected to continue to grow during 1952, with the production of uranium and rare earths being stepped up, two new companies entering the potash field at Carlsbad and national markets widening for New Mexico manganese, pumice and perlite.

NORTH CAROLINA

★**Barron Mica Mining Corp. of** Spruce Pine, has obtained a certificate of incorporation from the North Carolina secretary of state to mine and process mica. Authorized capital stock is $40,000. Incorporators are Henry Grind-



Cut Haulage Costs

WHEN EDISON Nickel-Iron-Alkaline Storage Batteries power your mine-haulage equipment, they help you cut costs in several ways. Their unequaled dependability gives the closest approach to failure-free, uninterrupted haulage it is possible to obtain. That's because their all-steel cell construction withstands rough usage; their alkaline electrolyte is a preservative of steel; their electrochemical principle of operation is free from self-destructive reactions.

They do not require critical adjustment of charge rates — can often be charged direct from the d-c power supply. They can be fully recharged in six to seven hours, which helps get all charging done during off-peak periods.

Get a current price quotation—you will probably find initial cost lower than you think. Couple this factor with well-known Edison long life and you will have the key to year-after-year economy. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. Thomas A. Edison of Canada, Limited, Montreal.

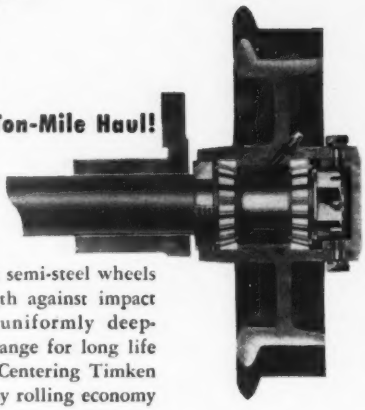
YOU CAN ALWAYS RELY ON

EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES

Card Wheels for Lowest Cost per Ton-Mile Haul!



Card heat treated cast semi-steel wheels give maximum strength against impact shock. And they're uniformly deep-chilled at tread and flange for long life in severe service. Self-Centering Timken roller bearings add easy rolling economy to durable *Card* wheels.

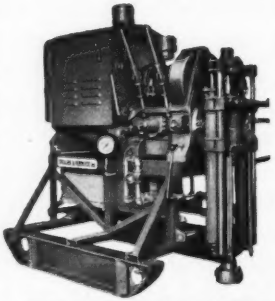
Also ask about Card Alloy Steel Wheels

C.S. Card Iron Works Co.
2501 WEST 16TH AVE.
DENVER, COLORADO

MODEL 40-C

The Best Machine for Most Core Drilling Jobs

This is our latest model—designed for highest possible percentage of good core recovery on jobs up to 1000 ft. in depth (¾" core) no matter how severe the operating conditions. Rugged construction, liberal use of alloy-steel parts and anti-friction bearings throughout, permit long periods of high-speed drilling at minimum expense. Other modern machines and a complete line of improved accessory equipment provide for every drilling and sampling requirement. Write for catalog.



Model 40-C Diamond Core Drilling Machine, with Gasoline Engine Power Unit and Oil-Operated Hydraulic Swivelhead.

CONTRACT DRILLING

Besides being manufacturers we are one of the oldest and largest contractors for any type of Core Drilling, including Grout Holes and Grouting. Sixty years of successful experience, superior equipment and ample financial resources, assure satisfactory results. Estimates submitted promptly on request.

"TRUCAST" BORTZ DIAMOND BITS

have proved their superiority for years in all types of rock formation. Available in a wide variety of standard and special types ranging from 1½" to 7¾" in diameter. All bits set with first-grade African bortz unless otherwise specified. Bulletin 44-A gives complete information.

SPRAGUE & HENWOOD, Inc. Dept. MM Scranton 2, Penna.

See our four-page insert in the Mining Catalogs

North Carolina *(Continued)*

staff of Celo, Cecil Phillips of Wing, and John C. McBee of Bakersville.

★**North Carolina Board of Conservation and Development** granted a 10-year lease to Burnup & Sims Inc., of West Palm Beach, Fla., for exclusive mining privileges of ilmenite and other mineral sand deposits along shoreline and under waters of Albemarle Sound. Agreement provides that company will pay the board 30¢ per gross ton of concentrated ilmenite obtained.

OREGON

★**Preliminary figures** of the U. S. Bureau of Mines show total value of the five metals, gold, silver, copper, lead and zinc, for 1951 to be $294,505 or 30% lower than in 1950. Tonnage of these metals fell to 1,140 tons or a drop of over 73%. In 1951 gold production declined 27%, silver about 56%, copper 44%, lead and zinc each 88%. About 96% of the total valuation was in gold, estimated at $282,240; silver accounted for $5,439; copper, $5,209; lead, $714; and zinc $903.

★**Laurence Roba's** mercury property in southern Grant County is operating and has shipped several flasks of quicksilver. The plant has a capacity of about 10 tons daily.

★**Bonanza quicksilver mine** in Douglas County which resumed operations last April has been producing steadily with an estimated value last year of $250,000. Exploratory work on the 500 and 600-ft. levels has made additional ore available.

★**W. S. Robertson,** of the Oregon Chrome mine, and associates are exploring a chrome deposit at Cyclone Gap, just south of the Oregon border, in Siskiyou County, Calif. The tunnel has been reported 30 ft. into a chromite deposit.

★**Among late approvals** for exploration projects in the northwest by DMEA is the Platnor mine of Cook County. Application was made by Owen Pigmon and the $20,460 project has received approval (the government's share being $15,345).

★**M. A. Hanna Co.** is sinking a shaft and continuing to drill at Nickel Mt. near Riddle.

★**The government's chrome depot** at Grants Pass has installed new sampling equipment, including a small crusher, rolls, vibrating screen, and electric drying oven. Virtually all the chrome mines in the southern Oregon-northern California area have been closed because of heavy snow.

★**Harbison-Walker Co.** has entered into arrangements with Bristol Silica Co. for joint operation of the Bristol silica quarry in Jackson Co. The Bristol Co. will continue to quarry quartz in order to supply its crushing plant at Rogue River, and the Harbison-Walker

Co. will continue to quarry quartz and ship to a plant in the San Francisco Bay area where silica brick will be produced.

★ **Orr Chemical & Engineering Co.** has started production of activated limonite at its new plant at Scapoose. Finely ground limonite is prepared from a deposit near the plant. Activated limonite is used as a sulphur scrubber by Portland Gas & Coke Co.

★**Exploration of ferruginous bauxite deposits** in northwestern Oregon is being continued by Aluminum Company of America, but on a greatly reduced scale.

★**Rice Bros.**, general contractors of Marysville, Calif., are constructing a mill for concentration of chromite on Hardscrapple Creek in southern Josephine County. They will be associated with A. W. Waite in operation of the mill. Milling equipment will include a ball mill, jigs and tables. Capacity will be 300 tons per day.

★**Snow in southern Oregon** and northern California has hampered chromite production to a considerable extent, but through December operators continued preparations for renewed activity in 1952. Black Diamond mine near Bolan Lake produced about 75 tons of good grade lump ore and 75 tons of concentrating grade ore before snow forced suspension of operations.

★**Late in November**, Strategic Minerals Corp, began operating its chromite mill near Galice. According to W. D. Plumley, president, the mill will be in limited operation for a short time pending installation of a second concentrating table. About 1,500 tons of milling grade chromite from the Sordy Mine had been stockpiled at the mill.

★ **Near Rogue River**, Roy A. Mills and W. H. Holloway are converting the mill at Homa mine for concentration of chromite ore. The mill, which was originally built for gold ore, will have a capacity of about 50 tons per day. Mills and Holloway are leasing it from the Tyrrell Manganese Co. of Medford.

★ **Jack Leonard and Joe Inman** continued their Caterpillar-tractor operation at the Jim Bus, Black Beauty, and Midnight claims near Selma. During 1951 they produced about 200 tons of good lump ore from this property which they lease from James Gallaher of Grants Pass.

UTAH

★Park Utah Consolidated Mines Co's Ontario property in the Park City district will be improved shortly by the placement of additional pumping equipment designed to deal with an increased water flow, according to **Paul H. Hunt**, vice president and general manager. A core drill hole being sunk from the surface near the No. 3 shaft at the Ontario workings will go to the 1,700-ft. level, and will provide electrical power for additional pumps which are rated at 1,500 hp.

Water now being pumped at 600 to 800 gph presents no problem in the Park Utah operation. However, the new installation is expected to allow for expanded workings at depth in the Ontario, where additional water problems are expected. Water is presently pumped from the 1,700-ft. level to the 1,500-ft. level, where it passes out through a drain tunnel.

The core-drilling contract is being handled by Robinson Drilling Co. of Salt Lake City.

Meantime , retimbering the north portions of the Star of Utah Tunnel in New Park Mining Co.'s ground is continuing. The tunnel renovation is being conducted in line with an agreement under which it is to serve as an entry into Naildriver Mining Co. ground by way of New York. The Naildriver firm is an affiliate of Park-Utah, and its ground will be the scene of a search for lead-zinc-silver ore when the old Star tunnel is rehabilitated. Work has been slowed due to badly caving ground and the difficulty of securing skilled miners.

★**New Park Mining Co.** has acquired the 155.744 acres of mining claims of the Troy Mining Co. in the Park City district. Stockholders of the Troy Mining Co. have voted approval of the $50,000 purchase plan. The mine claims being acquired include Troy's Small Hopes, Viola Lone Pine, Vancouver and Troy, all in U. S. survey 4956, and the Great Hopes, Viola No. 2, Lone Pine No. 2 and Prince in U. S. survey No. 5911.

New Park had gained voting control of the East Utah Mining Co. (with claims in the same vicinity) early in 1951. Before the Troy and east Utah acquisitions, New Park had 4,850 acres of patented lands and mineral right and some 5,000 mining claim locations in the Park City district.

★**Officials of Kennecott Copper Corp.'s** Utah Division and a joint bargaining group representing five unions announced late in January an agreement retroactive to Jan. 1 granting a 33¢ per eight-hour shift cost of living increase. The increase, expected to gain Wage Stabilization Board approval, affects 3,600 Kennecott workers affiliated with five unions. Acceptance by the International Union of Mine, Mill and Smelter Workers was, however, subject to the negotiation of similar cost of living boosts by locals at Kennecott properties in Nevada and New Mexico.

★ **Another attempt**, the third within 15 years, will be made in a few months to place large sulphur-bearing ore deposits in Utah on a commercially productive basis. Chemical Corp. of America has announced plans to put a $300,000 pilot plant for the production of elemental sulphur into

A WELL-KNOWN Idaho mine is emptying the ore cars shown herewith in 10 seconds flat. It is doing so with the help of a CLEVELAND Type LSRR air vibrator. With this vibrator the ore is emptied without any bumping with a lomocotive. Dumping time is reduced to one-third to one-tenth of that required before the vibrator was installed.

One man handles the complete operation.

It's a simple operation: The vibrator is permanently installed on an air line along side the track over the ore pocket. Each car on the level has a female bracket welded on the sloping side of the car. As a car is pulled over the pocket, the dump is tripped and the vibrator slipped into the bracket. Air is turned on with a hand valve, the car is emptied, and the vibrator is lifted from the bracket.

The CLEVELAND Type LSRR is being widely used on other materials handling equipment, such as bins, hoppers, chutes and flasks. Its intensity of vibration can be varied at will, to either gently persuade the material or deliver heavy, hammer-like blows.

What's Your Problem?

We have a complete line of air vibration equipment.

THE CLEVELAND VIBRATOR COMPANY

2835 Clinton Ave. · Cleveland 13, Ohio

Filament or Spun Yarn

Here's a list of our synthetic filter cloths and the kind of yarn from which they are manufactured:

Cloth	Filament	Spun
Nylon	Yes	Yes
Orlon*	Yes	Yes
Dynel	No	Yes
Vinyon-N	Yes	No
Vincel**	Yes	No
Glass	No	Yes

Note: Fabrics of blended filament and spun yarns are also available in several of these fibers.

Filament yarn fabrics by their very nature are smooth surfaced, affording exceptional tensile strength, high capacity and clean discharge. At times, however, they may not give desired clarity of filtrate or the resilience necessary for proper sealing. In such instances, a spun yarn fabric can excel because its fibrous surface aids in the entrapment of fine particles. In addition, a spun yarn creates a bulkier compressible cloth. Blended fabrics are designed to offer a maximum of strength with a higher degree of retention as well. Experience will tell you which is the controlling factor when ordering cloth; or, if you would like, we'll be glad to supply comparative samples.

Consider the value to you of our two-way service in connection with filter cloths: a wide variety of synthetic yarn cloths, in addition to our cotton cloth, which have many desirable characteristics for handling chemicals, hot and cold; and a selection of yarn or combination of yarns to best fit your filtering requirements.

Remember, we have at our New Haven and Salt Lake City factories, facilities for making up elements for any type of filter in all the available fibers.

*TM—E. I. DuPont de Nemours & Co. Inc.
*TM—UCC
**TM—NFMC (applied for)

Weavers of Industrial Filter Media for over Forty Years

The National Filter Media Corp.

General Offices & Mills: New Haven 14, Conn.
Western Office & Factory: Salt Lake City 1, Utah

Sales Offices—Representatives

Chicago, Ill. 2627 West 19th St. | Cincinnati, Ohio Rosslawn Center Bldg. | Houston, Texas 1406 Second National Bank Bldg. | Oslo, Norway Nicolai Friis | Johannesburg, South Africa Edward L. Bateman

Utah *(Continued)*

operation in early 1952 at Sulphurdale.

Clarence R. King of Santa Ana, Calif., consulting engineer for Chemical Corp. of America, has reported that diamond drilling indicates the presence of 3-million tons of sulphur-bearing conglomerate rock in the district, with the ore running 25% brimstone.

The pilot plant is slated to have an ore capacity of 100 tons per day. Production will go to the several chemical companies who are reportedly backers of Chemical Corp. of America. And the small surplus is to be sold on the open market by the affiliated Western Sulphur Industries, Inc.

If the early operations prove economically feasible, a 1,000-ton mill would be erected at Sulphurdale. Sulphur-bearing formations occur as outcroppings and down to about 30 ft. below surface. Additional diamond drill tests are planned in 1952. According to Mr. King, conventional processes will be used. In addition to the production of elemental sulphur, consideration is being given to the making of low-grade "soil-sulphur" for agricultural needs.

★ **The University of Utah's** Economic and Business Review reports that the mining and concentration of volcanic ash, pumice, perlite and vermiculite has "expanded significantly" in the past year.

In Salt Lake City the Buehner Block Co. is producing 15,000 units per day from red cinder and pumice.

William H. Prince & Sons Co. is producing 12,000 units daily from Fillmore volcanic ash, and pumice from the Kanosh and Cedar Valley areas of Utah as well as Idaho Falls. Plants have also been established in the Ogden and Provo areas for cinder and pumice-block production.

Combined Metals Reduction Co., shipping raw processed perlite to plants throughout the nation from Pioche, Nev., is reported setting up an experimental perlite processing and expansion plant at Bauer, Utah.

Utco Products Co. with mining operations at Milford, Utah, is crushing, sizing and expanding perlite at a Milford plant. Perlite Inc., Utah Perlite Products Co. of Salt Lake and Lehi Cinder Block Co. are all actively engaged in perlite operations within the state.

Vermiculite, while not mined in Utah, is now being exfoliated by the Intermountain Insulation Co. in Salt Lake City, using material from Montana mines.

The University study notes significantly that production of lightweight building aggregates is "characterized by few mining companies but a large number of expanding plants."

★ **A compilation on available iron ore** issued by the United States Steel Co. has renewed interest in Utah's

position as the prime supplier of iron ore for western furnaces by setting the commercially mineable iron ore now known to exist in Iron and Washington counties of the state at 200-million long tons. The USS figure notes that it refers to "ore reserves presently known . . . situated and of such a composition as to be commercially mineable." The reserves cited are at Pinto-Iron Springs and Bull Valley.

USBM had previously estimated a total of 350,949,000 long tons at those two locations as measured, inferred or unclassified reserves. The Pinto-Iron Springs deposits have been worked extensively, particularly since establishment of the Geneva, Utah, plant of USS some 200 m. north. Of 9,821,947 long tons of Iron County ore mined from 1923 till 1946, more than half was taken out during the 1943-46 period.

The USS study indicates that Pinto-Iron Springs ore now being utilized runs 45-50% iron, with Bull Valley deposits averaging about 53%. Ore bodies, lying at or near the contact of the monzonite laccoliths and the Homestake limestone occur in disconnected masses in a general area three mi. wide and 23 mi. long.

Indications that further commercial orebodies exist are seen in the survey's notations that iron ore exists in the Wah-Wah Mountains of Beaver County and the Blue Mountain area near Milford. Further deposits may be located at Cove Mountain in Washington County and near Paragonah in Iron County. The note is made that "little or no extended prospecting or development" has been carried out at these deposits, partially as a result of known transportation problems and the shortage, until recent years, of western markets for iron ore.

★**A two-day work stoppage** at the Midvale plant of the United States Smelting, Refining and Mining Co. ended Jan 31—as new snow fell on Utah's mining region to remind labor and management that the white stuff could cause labor trouble, as well as operating difficulties.

The Midvale walkout, with 400 men affected, came about when members of Local 4284, CIO United Steelworkers of America, went into a continuous union session in protest against a four-day-week work schedule that had been posted for the blast furnace department. About 60 men are directly involved in that department.

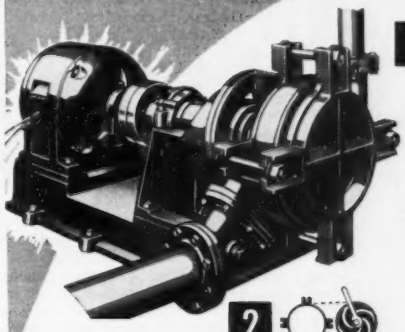
Oscar Glaeser, assistant to the vice president and general manager of the concern, noted that the reason for the work week reduction was the lack of ore, brought about by record snowfalls that had blocked shipments from mines at Eureka. The walkout or work stoppage ended when men voted to return to duty upon a report from CIO staff representative George Haycock that every possible effort was being made to keep sufficient ore coming to the smelter to provide at least five days work in future weeks.

Morris

Type R Slurry Pump

Gives Longer Service, Less Trouble

because



1

No internal studs or bolts — no troublesome internal joints and fits. Suction Disc Liner is merely *clamped* into position between disc and shell. Fewer wearing parts mean less maintenance and longer uninterrupted service.

2

Impeller and shaft sleeve of the Morris Type-R Slurry Pump can be renewed *without disturbing* the suction and discharge piping or the bearings. This means considerably less lay-up time.

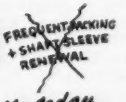
3

Due to the clamping effect of the bolts on the discs, the shell is not subject to high stress. Consequently, the shell can be made of a wide variety of materials, including those of high abrasive resistance. Yet these materials need not necessarily be of high tensile strength.

4

Hydraulic passages of the suction discs are extremely large and velocities are low. As a result, wear is minimized and renewal infrequent.

5



Stuffing box troubles are practically eliminated because the suction gland is under low suction pressure only.

Write today for free bulletin

Practical information in Bulletin No. 181 shows by performance curves just how the Morris Type-R Slurry Pump fits specific operations . . . describes exclusive construction features that cut operating costs.

FOR MINING OPERATIONS

Morris Type-R Slurry Pump handles all types of mixtures containing abrasive solids and chemicals in suspension, including acid slurries and sludges . . . and sludges containing soda ash, ore concentrates, tailings, slag, coal, etc.

MORRIS MACHINE WORKS

Baldwinsville, N. Y.

Branch Offices in Principal Cities

MORRIS *Centrifugal Pumps*

Export Sales Office, 50 Church Street, New York 7, N. Y.

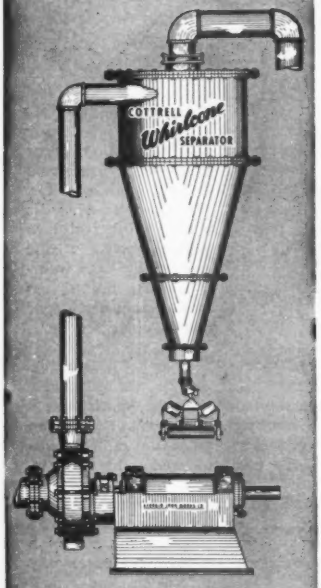
NOW, YOU CAN RECOVER YOUR FINES WITH THIS

COTTRELL

Whirlcone

SEPARATOR

PAT. PENDING



This WHIRLCONE rubber-lined separator is the simplest and most efficient method of separating fines ever invented. Every one sold bears its own testimonial. Write for further information and prices.

The 4" slurry pump pictured is the famous Georgia Iron Works slurry. These pumps are made in sizes from 2" to 14".

GEORGIA IRON WORKS CO.

Marbury Street, Augusta, Ga.

Exclusive U. S. A. Representatives

Utah (*Continued*)

Meantime, snow-caused difficulties at Eureka continued for most of January, with a record snow virtually burying open-pit and above-ground entries of the North Lily, Dragon Consolidated and Chief Consolidated mines.

★**D. H. Whittenburg,** chairman of the Utah State Road Commission, has reported the signing of a federal-state agreement to build or improve 293 mi. of access roads and trails in the Utah section of the Colorado Plateau uranium districts.

★**The Salt Lake office** of USBM has released a report on an experimental effort to recover vanadium mineral from the huge phosphate deposits of Idaho, Montana, Utah, and Wyoming. The process developed by Bureau metallurgists makes it possible to recover both vanadium and phosphorus, according to the report.

★**A Texas firm** which never previously operated in Utah, King Manganese Corp. of Houston, has opened branch offices at Kanab, Utah, preparatory to mining manganese ore in Kane County.

The company plans an open-pit mine at the old Blackbird properties in Section 2, Township 42 South, Range 3 west. It is likewise reported preparing to establish a simple beneficiation plant for the separation of manganese ore nodules from clays and shales. Some construction and the removing of overburden for the start of the operation was under way in late January.

King Manganese officials have reportedly contracted for delivery of "a substantial tonnage" of manganese ore to the federal government, hauling by truck to the D & RGW railhead at Marysville, or the UPRR at Cedar City. Immediate plans call for beneficiation of some 200 tons per day, expected to produce approximately 20 tons of high-grade manganese ore. Construction of a larger beneficiation plant might follow if feasible. Current plans call for employment of 30 miners in the Kane County operation. The property King Manganese is developing was worked to some extent by Snyder Mines Co. during World War II, when some of its ore was sold to the government.

★**The by-products refinery** of Kennecott Copper Corp.'s Utah Copper Division went into operation without fanfare in January. The refinery, adjacent to the electrolytic refinery which opened a year ago, is shipping gold and silver to the U. S. Mint at Denver.

The partial processing of such by-products as selenium, tellurium and nickel is officially reported under way. In addition, it is known that final processing of selenium and tellurium is planned at the installation.

★**The office** of Senator Arthur V. Watkins, (R) Utah, has indicated that a Salt Lake City regional exploration office of the Raw Materials Division of the Atomic Energy Commission will be set up at once. The Marysvale, Utah, uranium district will come under its jurisdiction, as will much of Nevada. The Marysvale field exploration office, formerly under the Denver district of the New York exploration office, is expected to close, being replaced by a suboffice to be established at Richfield, Utah, which in turn would be under the Salt Lake City regional office. However, Utah uranium fields in the Colorada plateau—namely those in Emery, Grand and San Juan counties—are expected to continue in the Denver jurisdiction. As reported in Salt Lake City, the office in Utah's capitol city will employ ten scientists, with an additional force expected later. No ore purchases or contract negotiations would be handled in Salt Lake City, the staff at the new facility dealing solely with scientific phases of exploration for raw materials.

WASHINGTON

★**Production of gold, silver, copper, lead and zinc** in 1951, amounted to $14,326,562, **a record high** according to preliminary figures released by the U. S. Bureau of Mines. This showed an increase of more than $1½-million over the 1950 production. Zinc led the way—up more than 29%. But there was a decline in the other four metals —gold down 25%, silver 7%, copper 17% and lead 23%.

Total zinc production was 4,300 tons greater than in 1950. Leading zinc producers in order of production were: Grandview, Pend Oreille, Goldfield and Holden. More than 100 tons of zinc from Metaline Mining & Leasing Co.'s development work at the Metaline Contact mine was a part of the zinc output.

Four chief producers of gold ranked as follows: Anaconda's Gold King mine at Wenatchee, Knob Hill at Republic, Howe Sound's property at Holden and Alder Gold-Copper mine at Twisp. Howe Sound's Holden ranked first in copper production and Alder, second. In silver, Knob Hill was first, Howe Sound second, Gold King third and Bonanza Lead at Bossburg fourth. Lead production was nearly 2,400 tons less in 1951 than the previous year with leading producers ranking as follows: Pend Oreille mines at Metaline Falls; American Zinc's Grandview at Metaline Falls; the Bonanza at Bossburg; Goldfield Consolidated's Deep Creek and Anderson mines near Colville.

★**First production loan** to a mine in the Inland Empire was $50,000 to Tungsten Mining & Milling Co. from RFC under the government's new DMPA program. Machinery for the mill at the company's Germania mine near Fruitland will be purchased, according to Paul Casey, president. The

company need not match funds under this loan but must provide capital for operation until returns are realized. An exploration loan of $25,987 had been secured through DMEA last October. Mr. Casey reported that the mill would have a capacity of 300 tons daily, and that operation of the mill was expected to begin in May, at the Stevens County property.

★**Bear Creek Mining Co.,** a subsidiary of Kennecott Copper Corp., licensed to do business in the state, has opened an office in Spokane. It is headed by mining geologist L. B. Moon who had been with the U. S. Bureau of Mines for 12 years.

★**New Jersey Zinc Exploration Co.** a subsidiary of New Jersey Zinc Co. of New York, has also opened a new office in Spokane. Thomas F. O'Neill, geologist is in charge.

★**As soon as weather permits,** Three Peaks Mining Co. of Salt Lake City will bring in equipment and start work at properties in Stevens County. G. R. Shallenberger, the company's northwest representative, reports that more than 500,000 tons of iron ore have been contracted for, for shipment to Japan. Dumps of the old Electric Point mine at Leadpoint, the Kulzer mine at Valley and some smaller iron ore properties which have been leased and optioned are among properties to be worked. From each of the first two properties production may be from 500 to 1,000 tons a day. Mr. Shallenberger estimated that Electric Point has 200,000 tons of 50% ore.

★**The Josephine mill** of Pend Oreille Mines & Metals Co. which had been shut down last summer because of labor shortage started operating Jan. 2, and is handling 650 tons daily, six days a week. This together with the output of 800 tons a day at its new plant across the river gives it a total output of 1,450 tons daily or 450 tons more than is being currently produced at its subsidiary, Reeves MacDonald mine which is just across the Canadian border.

★**Pioneer Mining Co.** recently filed articles of incorporation, under which it will operate the Longshot mine northeast of Colville. The company is bringing in equipment, preparing for underground operations in 1952.

IN CANADA

ALBERTA

★**A $12-million nickel refinery** will be built at Fort Saskatchewan, 11 mi. northeast of Edmonton, Alta., by Sherritt-Gordon Mines Ltd. The new plant will handle ores from the company's new operations at Lynn Lake, in northern Manitoba. It will produce 17-million lb. of refined nickel per year. (Canada's present production is about 275-million lb.) Construction

E. A. GODOY & CO., INC.
CUNARD BUILDING, 25 BROADWAY
NEW YORK 4, N.Y.

SALES AGENTS
Representing Producers and Shippers of
FERROUS & NON-FERROUS ORES

SPECIAL TODAY ONLY
FREE MINE TIMBERS
to all users of
★ OSMOSALTS
★ OSMOPLASTIC
★ and M-T-M (Mine Timber Mix)

The Mine Proven Wood Preservatives That Will CUT YOUR TIMBERING COSTS IN HALF Yes, in the future, you can get half of your mine timbers *absolutely free* because OSMOSE Treated Timbers will save you at least half your annual timbering bill. By making all timbering in *permanent places* LAST 3 to 5 TIMES LONGER, Osmose Treated Mine Timbers not only save you the cost of new timbers, but ALSO the high labor cost of making replacements.

There are two ways for you to cut your timbering costs in half: (1) We will supply you with Osmosalts, or Osmoplastic or M-T-M (Mine Timber Mix), and you can TREAT YOUR OWN TIMBER or (2) We can sell you ALL TYPES of Osmose Treated Mine Timbers direct from one of our mills. Either way you get BIG SAVINGS! Write for complete details!

Send for Illustrated Booklet
"Force Down Your Operating Cost" is a 16-page book that shows and tells all about the Osmosalts treatment. Write for it today!

OSMOSE OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.
TOWER 2, CONTINENTAL OIL BLDG., DENVER, COLORADO
Main Office: 1437 BAILEY AVE., BUFFALO, N. Y.

EXPLORATION COST...

7 cents per acre!

for the recent air survey*
in eastern Pennsylvania
which uncovered
a massive new iron ore body
in a blind area
at a depth of 1500 to 3000 ft.!

Aero Service made this survey
with the airborne magnetometer.
Write AERO today
for more information
about this and other
successful surveys for
chrome, nickel, ilmenite,
asbestos and other minerals.

*900,000 acres—part of our over 300,000 miles of aeromagnetics.

AERO
SERVICE CORPORATION
PHILADELPHIA 20, PENNSYLVANIA
Oldest Flying Corporation in the World

TOPOGRAPHIC MAPS • PLANIMETRIC MAPS • PRECISE AERIAL MOSAICS
AIRBORNE MAGNETOMETER SURVEYS • RELIEF MODELS • COLOR PHOTOGRAPHY

Alberta *(Continued)*

will start this spring or early summer, and completion is scheduled for the fall of 1953.

BRITISH COLUMBIA

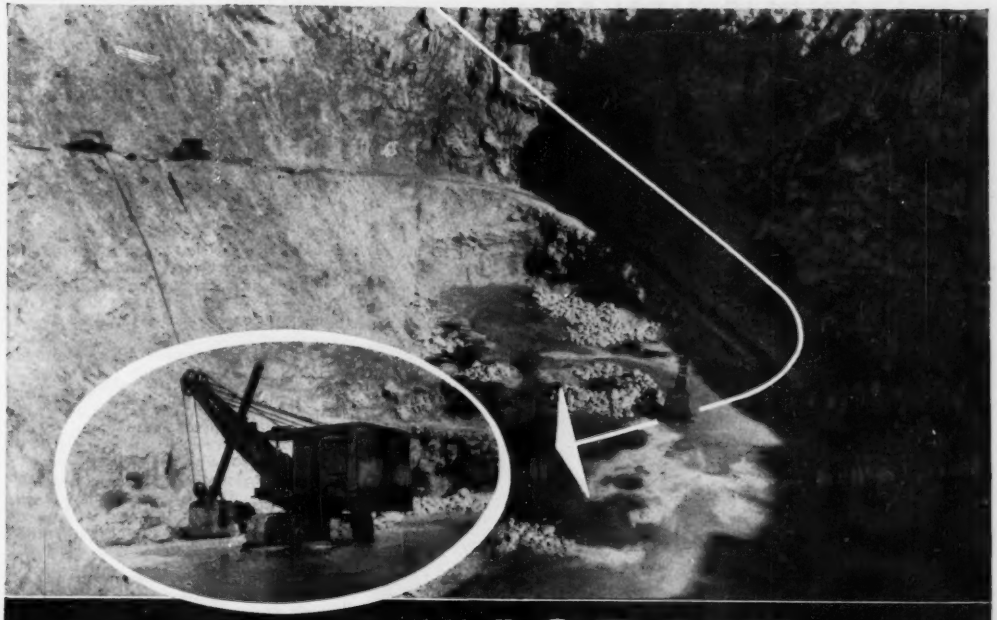
★**Shortages in the United States and Europe and a bright price outlook for copper** have touched off one of the biggest searches for a single metal in British Columbia's history. Large U. S. copper producers have joined B. C. mining firms and prospectors in a scramble for new deposits. In the search are Kennecott Copper Corp., working through its subsidiary Kennco Explorations (Canada) Ltd., American Smelting and Refining Co.; Newmont Mining Corp., working through Berens River Mines Ltd.; Noranda Mines Ltd.; and Anaconda Copper. Granby Consolidated, operating at Copper Mountain, near Princeton, is also exploring, and Britannia mine on Howe Sound, now producing more zinc than copper, has stepped up development and exploration. A comeback may be in store for the Phoenix and Rossland areas where B. C.'s first copper was produced. Attwood Copper Co. has an active exploration campaign under way and is following up information uncovered by new exploration methods.

★**Communists and other subversives** will be barred from employment in Consolidated Mining & Smelting Co. operations at Trail, company officials announced. The company, however, cannot legally discharge known Communists who are permanent employees except for cause under the collective bargaining agreement. Majority of company employees in Trail smelter are members of International Union of Mine, Mill & Smelter Workers, now certified as bargaining agent in the plant and regarded by Canadian Congress of Labor as a Communist-dominated union. The "other subversives" applies to workers technically avoiding Communist Party membership but continuing to use their influence "in furthering policies and aims dictated by a foreign government."

★**International Union of Mine, Mill & Smelter Workers** will seek a basic $2 an hour wage rate for its miners in western Canada and the United States, the Union's national convention decided in Vancouver. The Union will seek wage raises for other classifications in proportion.

★**Surface stripping,** in a new operation at Consolidated Mining & Smelting Co.'s Sullivan mine at Kimberley, is reported to have uncovered 2-million tons of ore which will be mined at the rate of 3,000 tons a day.

★**Estella Mines Ltd.,** new base metals producer near Kimberley, has sold its zinc production for this year to the



LOOK AT THIS LORAIN AFTER MOVING 2½ MILLION YARDS OF ROCK!

LOOK ***at this record!*** After more than 12 years and 2½ million yards of hard digging, this 1½-yard Lorain-79 shovel *is still at work* for R. A. Wade & Co., Bessemer, Alabama.

LOOK ***at that quarry!*** It's 200 ft. deep and millions of yards of tough dolomite limestone have been dug from it by this Lorain to feed blast furnaces in Birmingham. Surely, here's a job that calls for the best in shovels.

LOOK ***at the Lorain!*** It's still digging rock—still in good working condition. In 1939, as well as now, Lorains were built to break records in rock—proof of Lorain quality, stamina and endurance in the toughest kind of digging.

LOOK ***at the results!*** Imagine the earning power of this veteran Lorain . . . the profits it has paid . . . the satisfaction it has given its owner. These are reasons why R. A. Wade & Co. have 3 Lorains—why they bought the new Lorain-50 shown at the right!

• *Ask your Thew-Lorain Distributor for more proof of Lorain performance records!*

THE THEW SHOVEL CO., LORAIN, OHIO

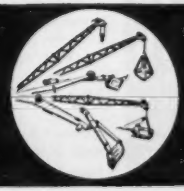
NOW LOOK AT THE NEW 50

This is Wade's newest Lorain.

They've just opened a new quarry and Lorain again is the choice. This time it is a 1-yd. Lorain-50. Equipped with shock-absorbing hydraulic (fluid drive) coupling, air assist on crowd, retract and hoist controls—air steer and tread lock—plus many other new and modern features—the Lorain-50—today's newest Lorain—is built to surpass even the amazing records of previous Lorain models—some still on the job after a quarter of a century or more!

THEW **LORAIN**®

on CRAWLER *or* RUBBER



SHOVELS
CRANES
DRAGLINES
CLAMSHELLS
HOES

THE VICTAULIC METHOD OF PIPING

EASIEST WAY TO MAKE ENDS MEET

The Victaulic Method is the only complete, modern mechanical development in piping construction . . . offering a fast, simple hook-up that streamlines piping . . . cuts costs.

The Victaulic Method represents a comprehensive system built around easy to install, versatile Victaulic Couplings . . . world famous for quick, leak-proof pipe connections. For use with these efficient couplings, Victaulic offers a complete line of modern Full-Flow Elbows, Tees, Reducers and other Fittings . . . plus Victaulic's easy-to-use, portable Vic-Groover Tools for preparing standard pipe ends easily and quickly. Victaulic Couplings, Full-Flow Fittings, and Vic-Groover Tools comprise the complete Victaulic Method for fast, dependable, on-the-job piping.

For new construction, repairs or alterations . . . for any piping job, big or small, the VICTAULIC METHOD *is the easiest way to make ends meet.* Mis-alignments, expansion and contraction are automatically taken care of by Victaulic and locked-joint, leak-proof piping is assured.

Save time, work, and dollars on piping construction—make that next job ALL VICTAULIC.

Write today for Victaulic Catalog & Engineering Manual No. 44-8C.

VICTAULIC
COMPANY OF AMERICA
P. O. Box 509 • Elizabeth, N. J.
Office and Plant: 1100 Morris Ave.
Union, N. J.
Telephone: ELizabeth 4-2141

28th VICTAULIC YEAR

California: Victaulic Inc., 727 W. 7th St., Los Angeles 14
Canada: Victaulic Co. of Canada Ltd., 406 Hopewell Ave., Toronto 10
Export: Pipe Couplings, Inc., 30 Rockefeller Plaza, N. Y. 20, N. Y.

British Columbia *(Continued)*

United Kingdom at a premium price. The contract gives Estella a 3¢ bonus over the United States price at St. Louis. Lead concentrates will go to Trail. Exploration will be stepped up when a new power house and compressor equipment are ready, probably by March. Production is averaging 150 tons of ore daily on a seven-day-week basis.

★**Western Uranium Cobalt Mines Ltd.** made its first shipment of tungsten concentrates from the Red Rose mine near Hazelton in January and the mill is now producing half a ton of concentrates per day. Initial shipment was worth $35,000. Western Uranium has a contract with Derb & Co. of London for 1250 tons of concentrates worth $6.5-million at the present market price. The mill is scheduled to be brought up to 75 to 80 tons of ore daily and 150 tons as soon as possible. Tuning up started Dec. 1. Actual production got under way Dec. 27. Work is continuing on a 200-ton mill at the nearby Rocher de Boule copper-gold-tungsten property.

★**Cariboo Hudson mine**, near Wells, has started drifting on its main tungsten occurrence. Operations have been under way on the property since early November.

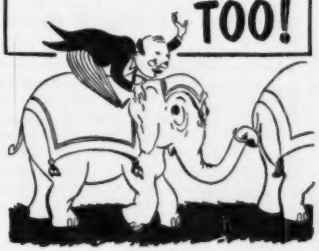
★**Emerald Glacier mine**, near Tahtsa Lake, which went into production in November, has been opened on three levels, with three major ore occurrences partially explored and developed. Production is being maintained depending on weather conditions. Objective is to ship 1,000 to 1,500 tons a month in winter and step up shipments from the silver-lead-zinc property to more than 3,000 tons a month when the weather eases. Ore is being shipped to the former Kenville mill ate Nelson, acquired by Emerald Glacier for 366, 667 shares of Emerald stock.

★**Kootenay Base Metals Ltd.** had scheduled a tuneup of its new 50-ton mill at Ft. Steele to begin in February. Underground development to prepare for mining established ore is on schedule and an underground drilling program is being started to trace a new ore zone between the second and first levels and follow its downward extension.

★**Zinc concentrates** from Whitewater mill of Kootenay Belle Gold Mines Ltd. are again being accepted by Comineo for treatment in Trail smelter. Kootenay Belle had difficulty marketing its zinc concentrates because of excessive soluble silica, but this problem was overcome by eliminating most of the silica through changes in flotation. Stockpile of zinc concentrates accumulated because of soluble silica content have been disposed of to Philipps Bros. of New York, N. Y.

★**Van Roi Consolidated Mines Ltd.**

LE-HI Makes a Good Connection TOO!



Specify LE-HI for all Hose Couplings!

Wherever hose is used there is a LE-HI hose coupling to match—from small tubing to large industrial applications.... The complete LE-HI line includes:

- Air Tool Couplings
- Welding Hose Couplings
- Steam Hose Couplings
- Fire Hose Couplings
- Acid Hose Couplings
- Sand and Blower Hose Couplings

SERIES 100

SERIES 600

- Drilling Hose Couplings
- Oil and Gas Hose Couplings
- Agricultural Hose Couplings

. . . plus complete lines of hose clamps, air valves and manifolds.

Sold through leading distributors and rubber manufacturers only.

"Old Doc" says: "Write now for your free copy of the complete LE-HI catalog"

HOSE ACCESSORIES COMPANY
1718 Lehigh Ave.
Philadelphia, Pa.

LE-HI Makes a Good Connection!

LE-HI
HIGH and LOW PRESSURE
HOSE COUPLINGS
TRADEMARK REGISTERED

near Silverton, expected to boost production with its new heavy-media separation plant to 150 tons daily, up from 100-125 tons daily in January.

★**Quatsino Copper-Gold Mines Ltd.,** developing magnetite iron ore deposits on Vancouver Island, reports C. D. Schultz & Co. Ltd. is currently making soundings to select a deep-sea dock location at Jeune Landing, closest point on tidewater to the deposits. The company has acquired eight crown-granted mining claims along the contact, carrying good exposures of iron ore appearing similar in structure to that on the Merry Widow claims.

★**Woodbury Mines Ltd.** reports finding of high-grade lead-zinc-silver ore in the Bell Tunnel of its Ainsworth property. Ore runs better than 10% in lead and zinc over 4 ft. with some silver and is of considerably higher quality than indicated by diamond drilling. A high grade section of the vein has assayed up to 40% in combined metals over a width of 8 in. Four known orebodies are being developed.

★**Vananda Mines (1948) Ltd.,** Texada Island, reports the drive into the Copper Queen mine reached 592 ft. by the year-end. It is expected to reach sections of the Copper Queen property indicated by old workings and valuable copper concentration is seen at a length of 1,024 ft. According to old reports, bottom workings of the Copper Queen carried values of up to 7% in copper with appreciable gold values.

★**Premier Border Gold Mining Co. Ltd.,** whose Portland Canal mine adjoins and connects underground with that of Silbak Premier, continues to make a profit in excess of expenses for shaft sinking and major deep-development program in hand. December production was 57 tons of lead concentrates and 135 tons of zinc concentrates after treatment of 1,188 tons of ore averaging 0.07 oz. gold, 2.44 oz. silver, 4.2% lead and 6.8% zinc. Net smelter returns were $40,522; operating profit $18,366, after marketing cost of $9,733 and production cost of $12,424.

MANITOBA

★**Callinan Flin-Flon Mines** reports diamond drilling 25 ft. of mineralization, of which 8.5 ft. averages 1.27% copper, 3.85% zinc, 0.76 oz. silver and 0.32 oz. gold. The drilling is being carried out on the Dan claim near the Manitoba-Saskatchewan border.

★**Le Pas Flin Flon Mines,** a subsidiary of Callinan Flin-Flon, has started diamond drilling on its 35-claim property east of Hudson Bay Mining & Smelting. Interesting mineralization has been encountered in three holes completed, but values have been noncommercial. Drilling will explore five anomalies in the area.

WEDGE-WIRE
Kleenslot
SCREEN GUARDS
(PAT. APPLIED FOR)

LONGER LIFE! Particularly adaptable for use at the discharge end of flumes. The guard is built right into the screen to keep the larger lumps of material above the guard bars permitting only the finer particles to pass over the screen. Precision made.

ECONOMY!! They are non-clogging, non-blinding, strong, rigid, uniform and consequently more economical in the long run.

Wedge-Wire CORPORATION
5607 CLARK AVENUE
CLEVELAND 2, OHIO

SEND FOR OUR ILLUSTRATED LITERATURE

Filter Cloths

For all types of Filter requirements. Cotton, Synthetic Fabrics, Straining Media, etc. Made to your pattern and specifications. Let us quote on your needs.

FILTER FABRICS, INC.
704 MARION BUILDING
CLEVELAND 13, OHIO

THE MOST COMPLETE LINE

There are almost 1500 types and sizes in Laughlin's quality line of drop forged fittings.

There are many different styles of shackles, swivels, hooks, thimbles, clips, sockets, eye bolts and other products designed for a wide variety of applications throughout industry. If you use wire rope or chain, you can be sure that Laughlin has the right — *and safest* — fittings for the job.

THESE EXCLUSIVE PRODUCTS

Safety "FIST GRIP" Wire Rope Clips . . . Fool proof, easy to install Fist Grip clips hold rope more securely, can't go on wrong. Fewer clips are required than for ordinary types, and they will not crush or distort the rope.

SAFETY HOOKS . . . The latch locks the load, will not open until released by operator. Strong, drop forged steel hook has improved latch that leaves 80% of throat opening. 15 sizes; 3 patterns, eye, shank and swivel.

"MISSING LINK" (Reg. U.S. Pat. Off.) . . . Cheaper than welding, safer than cold shut or cast link, "Missing Links" go on in a jiffy and are stronger than proof coil chain. 17 sizes from 3/16" to 1⅞".

CLEVIS GRAB AND SLIP HOOKS . . . These sturdy hooks are easily attached to any welded link chain. Pin and cotter make it easy to attach or remove for use on another job. Needs no connecting fittings or special tools.

Laughlin's new Catalog No. 150 lists the complete line of drop forged wire rope and chain fittings with illustrations, description and specifications. Write for it today.

LAUGHLIN THE THOMAS LAUGHLIN CO.
36 Fore Street
Portland 6 Maine

THE MOST COMPLETE LINE OF DROP FORGED WIRE ROPE AND CHAIN FITTINGS

Manitoba *(Continued)*

★**Trans-northern Nickel and Copper Mines,** also controlled by Callinan, is carrying out a magnetometer survey on claims held east of the Cuprus Mines Ltd. Plans are to follow up the survey with a program of diamond drilling.

★**Lee Gordon Mines Ltd.** reports that a diamond drill contract has been awarded to carry out further exploration of its Vamp Lake holdings. Homer Yellowknife Mines Ltd. has acquired an interest in the company. Canus Petroleum Corp. owns over 700,000 shares of Lee Gordon and has options on 1,500,000 more.

NORTHWEST TERRITORIES

★**A 500-mi. rail link** between Great Slave Lake in Northwest Territories and Edmonton is being considered, according to Leonard E. Drummon, secretary-manager of the Alberta and Northwest Chamber of Mines and Resources.

The line would be used to bring uranium concentrates to the Edmonton area.

Consolidated Mining & Smelting Co. of Canada is investigating the merits of Pine Point on Great Slave Lake as a northern terminus, and may arrange for construction of a railroad to ship concentrates to a site near Edmonton. Cominco owns the Con mine in Yellowknife Bay area, and a 60% interest in Rycon mine, and with Ventures Ltd. holds rights on 500 sq. mi. known as Pine Point Concession.

★**Eldorado Mining & Refining Co. Ltd.** plans to place its fire-damaged Port Radium plant back in production by May 1.

★**American-Yellowknife Gold Mines Ltd.** has started diamond drilling in search of lead and zinc deposits at Pine Point on the south shore of Great Slave Lake. The company has two diamond drills working through the winter.

ONTARIO

★**MacLeod-Cockshutt Gold Mines** had its best earnings yet in the quarter ended December 31st, netting 7.9¢ per share from gold output of $699,395. Best previous quarter was away back in 1942. During the year ended September 30, 1951, this veteran Long Lac area gold mine made record progress, thanks to good results from the new "F" zone.

★**Another veteran of the same area,** though not as successful, is undergoing another of its perennial winter drill tests. One of the first companies formed when the camp started 19 years ago, Oklend Gold Mines still

TISCO MANGANESE STEEL

for maximum resistance to impact and abrasion

TISCO MANGANESE STEEL
BALL MILL LINERS

TAYLOR-WHARTON, pioneer in the manufacture of high quality Hadfields Manganese Steel Castings, has maintained its top position for nearly two generations by proper design of castings, accurate control of process, and careful attention to customer requirements.

TISCO Manganese Steel is widely used for wearing parts in digging, dredging, crushing, grinding, pulverizing, conveying and similar equipment.

Specify "TISCO" when ordering new equipment or replacement parts from your supplier.

TISCO MANGANESE STEEL
ROLL SHELLS FOR CRUSHING ROLLS

●

Also Manufacturers of Other Alloy Steel Castings to Your Specification, Special Trackwork, and Seamless High Pressure Gas Cylinders.

TAYLOR-WHARTON
IRON & STEEL CO.

High Bridge, N. J. • Cincinnati, O.
Easton, Pa. • Birmingham, Ala.

FOUNDED 1742

★**Ontario Pyrites Co.** has come to life in the Sudbury area, stimulated by high base metal prices and a new hope that metallurgical complexities can be overcome. The company was formed some years ago to acquire the long-idle Treadwell Yukon and Sudbury Basin properties. First work will be done on the Sudbury Basin claims, where drilling in the 1920's indicated a million tons averaging 1.5% copper, 1% lead, 4.7% zinc, 0.02 oz. gold, and 1.6 oz. silver per ton. A three-compartment shaft will be sunk to 750 ft. to open three levels; adequate finances are now in the till.

★**Fab Metal Mines** is surface drilling a wide zone of sulphide mineralization on its property in Parkin Twp., Sudbury area. The company was formed late last year after preliminary prospecting had shown encouraging indications of copper and zinc.

★**The old Tip Top copper mine,** 90 mi. west of Port Arthur and 30 mi. north of the U. S. Border, is to have a new test. Coldstream Copper Mines was formed for the purpose. The property was first staked in 1895 and at one time produced 4,022 tons averaging 5.3% copper with additional values in gold and silver. The new company calculates that a million tons or more is indicated with grade about 2% copper.

★**The Kirkland Lake camp** is watching with intense interest the continued good depth results being obtained by Lake Shore Mines. In the new section on the 7,825-ft. level (deepest in North America) several hundred ft. south of the main break, close to 400 ft. of ore has been opened with a grade that looks like 0.75 oz. gold per ton across about 15 ft. What could be the westward and upward extension of this zone is being tested on the 7,325 level. The real importance of the new showing is that it may represent a second major break for the camp, duplicating at depth some of the sensational ore found in the original (or main) break closer to surface. While that is still in the realm of conjecture, there is no question that the find is of importance.

It could be of special significance to Kirkland-Hudson Bay Mines, whose property is on strike to the east, and into which the ore seems certain to extend; and to Teck-Hughes Gold Mines, on strike (but farther away) to the west. Teck's deepest workings are at 6,000 ft., which places the new area far below any tested Teck ground.

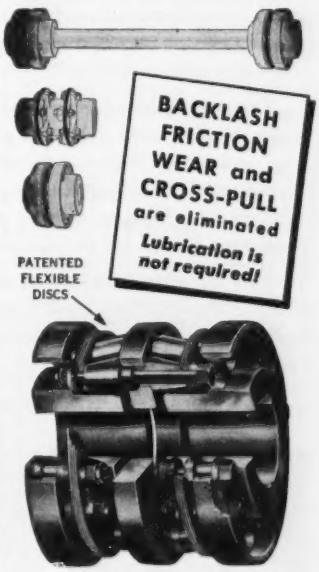
★**Nipiron Mines** has been formed to explore the possibilities of finding iron ore under the waters of Lake Nipis- holds its property and is still hopeful of finding ore. As most of the ground lines under the water of Little Long Lake, drilling can only be done from the ice during the winter months. Almost every winter has seen a new quota completed, with results just tantalizing enough to warrant more the next season.

THOMAS
Flexible ALL METAL COUPLINGS
FOR POWER TRANSMISSION
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings of special steel transmit the power and provide for misalignment and end float.

Thomas Couplings have a wide range of speeds, horsepower and shaft sizes:
½ to 40,000 HP
1 to 30,000 RPM

Specialists on Couplings for more than 30 years



THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT.

NO MAINTENANCE PROBLEMS.

ALL PARTS ARE SOLIDLY BOLTED TOGETHER.

Write for the latest reprint of our Engineering Catalog.

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

The all-hydraulic Hydrocrane reaches into windows, doors and box cars . . . over fences . . . under beams . . . between wires and beams — without moving crane an inch! Telescoping boom extends and retracts a distance of eight feet.

Telescoping boom plus precision hydraulic control combine to make the Hydrocrane ideal for placing conveyor machinery in shaft cage, unloading freight cars, erecting and dismantling machinery, cleaning up ore spillage under pockets, loading ore into cars, and handling mine timbers. Special hydraulic grapple picks up and sets down timbers without assistance — eliminates need of helper.

Here's a crane that fills the bill on dozens of surface jobs around the mine. It squeezes into close quarters — operates by cushion smooth hydraulic power — is controlled entirely by hand levers, no tricky foot work.

Write now for full details or see your Hydrocrane distributor.

159H52

Owners report 35 percent faster shaft mucking, 30 percent less manpower with new Hydromucker. Here's a fast mechanized way to remove muck in shaft sinking work—the Bucyrus-Erie Hydromucker. Heart of unit is a hydraulically operated clamshell bucket specially designed for close quarter work. Bucket loads material from shaft floor to skip, car or other suitable conveyor for removal to surface. . . .

Every crane function fully hydraulic—boom hoist, load hoist, swing, boom telescope, outrigger set and retract, bucket close.

BUCYRUS-ERIE
HYDROCRANE DIVISION
South Milwaukee, Wisconsin

Ontario *(Continued)*

sing. Showings were found a great many years ago on Iron Island, about 18 mi. across the lake from the city of North Bay, but no serious attempt has ever been made to investigate them. The new company is headed by Robt. J. Towsey.

★**Steep Rock Iron Mines** is upping its production sights, and is now thinking of producing 5-million tons of iron ore from its own operations annually by 1956. Output in 1951 was about 1.3-million tons with gross value of $11.9-million. Good progress is being made at each of Steep Rock's three projects. The Errington mine, from which all production to date has come, will be ready for underground production late this year. The job of dredging the overburden off the Hogarth mine, biggest task of its kind yet attempted in Canada, is proceeding on schedule, and surface drilling is continuing to mark out ore in the "G" orebody, between the two main mines.

★**American Zinc Company of Tennessee**, wholly-owned subsidiary of American Zinc, Lead and Smelting Co., has optioned a considerable amount of ground in Dorian and McTavish Twps., northeast of Port Arthur, from Andowan Mines. The property is a long-dormant lead-zinc prospect.

QUEBEC

★**Good indications** of zinc and silver ore have been secured in surface diamond drilling by Vermont Zinc Mines on its Montgay Twp. property. A subsidiary of Lavalee Mines, the company was formed late in 1951, and started drilling immediately. Best two holes to date show 7.0 ft. averaging 7.3% zinc with 1.12 oz. silver per ton, and 16.0 ft. averaging 5.49% zinc with 1.76 oz. silver.

★**Earliest exploration sensation** of 1952 has been Lake Dufault Mines, which developed new copper ore in drifting on the bottom horizon of Amulet Dufault Mines. Drilling is now in progress to probe for depth extensions.

Lake Dufault adjoins Waite Amulet in the Noranda area, and 14 years ago the two companies jointly turned over a block of boundary ground to Amulet Dufault, following discovery of the big orebody which has given the latter company the bulk of its production. The block, however, extends to a depth of just 1,200 ft., and the new ore (averaging 3% copper across 15 ft.) was found in drifting in the east part of the mine at that horizon. All ore below the drift in that section accordingly belongs to the Lake Dufault Company.

★**Anacon Lead Mines**, lead-zinc producer in Portneuf County, increased ore reserves in 1951 from 833,000 to 1,035,000 tons, despite a substantial increase in tonnage milled. Anacon

POINTING the WAY
To Continuing Prosperity

The set of figures in the middle of this page is news of high importance to every American.

In effect, it says that there is no basis in fact for all this talk about a collapse of capital expenditures plunging us into a depression following the industrial build-up for defense.

Such talk assumes that without defense orders business would spend relatively little for new industrial plant and equipment. The figures below show that that assumption is not justified.

penditures in 1953, 1954 and 1955, provided the money to carry them out can be obtained.

A Record in '52

As was expected, their plans call for another record-breaking volume of capital expenditures by business in 1952. But, as many did not expect, the McGraw-Hill survey also discloses plans for very heavy capital expenditures in each of the three years following. Expenditures now planned for those years are, to be sure, lower than those planned for 1952. But the significant fact is not that

BUSINESS PLANS FOR NEW PLANTS AND EQUIPMENT (Millions of Dollars)

	Actual Spending 1950*	Actual Spending 1951*	McGraw-Hill Survey			
			Planned	— Preliminary Plans —		
			1952	1953	1954	1955
Manufacturing	7,491	11,141	12,921	10,028	8,525	8,194
Mining	684	806	943	415	321	358
Railroads	1,136	1,564	1,642	1,248	1,117	1,002
Electric & Gas Utilities**	3,298	3,676	3,948	3,360	3,204	2,748
Other Transportation & Communications	1,392	1,592	1,721	1,671	1,943	1,839
ALL INDUSTRY	14,001	18,779	21,175	16,722	15,110	14,141

*U. S. Department of Commerce
**Electrical World (A McGraw-Hill publication) and American Gas Association.

The figures come from the fifth annual McGraw-Hill survey of business plans for new plant and equipment. Companies were asked to report through that survey not only their plans for 1952, but plans they now have in hand for capital ex-

they are lower. Experience shows that plans made several years ahead always overlook many expenditures that are needed later.

The significant fact is that the expenditures already planned for 1953-55 are so high. For example,

those now planned for 1955 would be higher than those of 1950, which, at that time, were second highest in our history.

If these plans are carried out we shall have an essential element of continuing prosperity. Sustained expenditures for capital expansion and betterment account directly for a large share of our employment and consumer income. Moreover, consistent modernization of industrial plant raises production efficiency and brings more and better goods and services within reach of more consumers.

It is not to be expected, of course, that we can come down from the peak of the defense boom without readjustments in some sectors of business. But if capital expenditures by business are carried out on the scale now planned, we shall be able to take any necessary readjustments in our stride, and continue to increase our industrial strength.

From V-J Day to the end of this year, manufacturing industries will have spent over $60 billion for new industrial plant and equipment. This is more than the value of all the plant and equipment these industries had on their books at the end of World War II. It is this heavy outlay that causes some, assuming most postwar plans for industrial expansion and modernization will be completed, to fear a collapse of capital expenditure.

Plans to Go Ahead

But American industry still has plans to go right ahead expanding and improving its facilities. This was the most striking single finding of this year's survey.* It disclosed also that after 1952:

— 83 per cent of the companies answering the survey are planning substantial further modernization.

— 48 per cent will need more capacity to make their present products.

— 33 per cent plan additional capacity to make new products.

It cannot be too strongly emphasized, however, that these plans represent what American industry *wants* to do. They are a concrete expression of hope and aspiration. As such they are extremely important, for they dispose of the idea that business considers the job of expanding and improving its facilities as finished, or anywhere near finished.

But the plans carry no guarantee of accomplishment. If they are to be realized, business must have the funds to carry them out. There is no assurance that the money will be available if the present level of corporation taxes is continued. Eight out of ten companies, according to the McGraw-Hill survey, will rely entirely on profits and reserves to finance their 1953-55 programs. So, in calculating their programs for these years, the companies were asked to assume relief from "excess profits" taxation.

Federal taxes now take at least 52 per cent of a corporation's profits, and 82 per cent of any profits in the so-called "excess profits" bracket. Despite this drain on their funds, companies are able to finance their 1952 programs because (1) they are borrowing heavily, and (2) many of them are getting government loans or special tax concessions on new facilities installed for defense purposes. But these are emergency aids.

Only Two Ways

When the present defense program tapers off, there will be only two ways by which business can possibly increase its principal source of funds for new plant and equipment. One way is to make more profits before the tax collector takes his cut. And the only way many companies, already operating at capacity and high efficiency, can do that quickly is by raising their prices. That is an unpopular method. Also, with the return to more competitive markets, it might be self-defeating.

The other way is for the federal government to release its strangle hold on business profits. The so-called "excess profits" tax—the 82 per cent tax which is really a tax on business growth—should be repealed, effective January 1, 1953. And a cut in the basic tax of 52 per cent on all corporate profits should come not much later. That is by all odds the most important single step toward assuring that business plans already made for capital investment in 1953, 1954 and 1955 are carried out. It is the most important single step toward sustaining our present prosperity.

Through its plans for continued expansion and improvement of its facilities, American business clearly points the way to avoid the depression that so many have feared — and the Communists have so ardently hoped — would follow the peak of defense mobilization. It will be a tragedy for our country and for Americans in every walk of life if we do not insist that business get the chance to follow this wise and constructive course.

McGraw-Hill Publishing Company, Inc.

*Note — A copy of the full report of this survey can be obtained by addressing: Department of Economics, McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York 36, N. Y.

has recently acquired control of Chibougamou Explorers.

★**Operating control of Chibougamau Explorers Ltd.** has been placed in the hands of Anacon Lead Mines, with the presidency assumed by M. J. Boylen, head of the latter company. Tentative plans for the property, located in the south Chibougamau area, call for a shaft to be sunk to 600 ft. to be equipped for hoisting a minimum of 1,000 tons daily. But in the meantime surface drilling is being continued to provide more details on the suggested 850-ft. ore length indicated by holes already drilled. Volume was calculated at 990 tons per vertical ft. averaging 0.33 oz. gold (cut) per ton, plus 0.73% copper.

★**Other properties** active in the south Chibougamau district include those of Uddlen Mines and Adnor Mines, both adjoining Chibougamau Explorers to the west, and that of Meston Mines, close by. All three companies have plans in hand for surface drilling, and all are supplied with adequate capital for the purpose.

★**New Calumet Mines,** established lead-zinc producer on the Ottawa River, made new records for output and profits in the year ended Sept. 30, 1951. Although tonnage milled was the highest yet, ore reserves increased to a record total. Gross value of production was $5.1-million from 259,214 tons ($4.5-million from 254,977 in 1950). Ore reserves at the end of the period stood at 927,285 tons averaging 6.7% zinc, 1.6% lead, 3.23 oz. silver, and 0.017 oz. gold per ton. A year previously they stood at 816,000 tons.

SASKATCHEWAN

★**Amax Athabasca Uranium Mines Ltd.,** Aurora Uranium & Gold Mines Lt., and Leadridge Mining Co. Ltd. (a subsidiary of the St. Joseph Lead Co.) have executed agreements covering prospecting and development of the properties controlled by Amax and Aurora in the beaver Lodge Lake area in the northwest corner of Saskatchewan.

Amax and Aurora own concessions adjacent to the uranium properties of Eldorado Mining Co.

The agreement between Amax, Aurora and Leadridge generally provides for Leadridge spending substantial sums on each of the two concessions in exploration and development. Options are also granted whereby Leadridge is given the opportunity to acquire working control of both Amax and Aurora.

IN AFRICA

★**Free State Virginia Gold Mining Company, Ltd.** may get into production in 1953—and at twice the rate originally planned. From Kennecott Copper Corp., Virginia recently obtained a loan of about $8,340,000 which bring Kennecott's total commitment to roughly $14-million. The extra funds will go, in part, for increasing the initial capacity of the Virginia mill to 50,000 tons per month—up from 25,000 tons. Reasons for the speedy development—initial production had been scheduled for 1955—were the record-breaking speed with which Virginia sank its shafts, and the additional moneys from Kennecott.

★**Inflation is really hurting** the South African gold mining industry, but increased revenue from premium-price sales has helped the industry greatly: In 1951, production was 11,505,000 oz.; working costs rose $14-million to $259-million; but sale of approximately 40% on the premium market brought in an extra $18.5-million. The net result: profits fell by about $7.6-million.

★**The first unit** of the Krupp-Renn kiln and plant for treating titaniferous iron ore in the Eastern Transvaal is due to arrive in the Union shortly. Because of the shortage of steel, the plant has been modified: A steel plant will be installed before the second pig-iron kiln is installed. The initial kiln will produce 70,000 annual tons

BIG OUTPUT LOW COST

Here's a Sauerman Crescent Scraper working between two moving towers, digging 5,000 cu. yd. a day from wide pit.

with a SAUERMAN DRAG SCRAPER

In a Sauerman Drag Scraper Machine you find a profitable combination of digging power, haulage speed, long reach, simple operation, economical maintenance.

An important exclusive feature of the Sauerman scraper machine is the Crescent scraper. Because of its streamline design, the "Crescent" requires less linepull than any other type of scraper, both in excavating and in conveying. It penetrates hard material with the ease of a plowshare, gathers a full load in a few seconds, then rides its load speedily to the dumping point where it makes an instantaneous, clean dump.

The operator, sitting in a comfortable control station, easily guides the scraper over a large area. Automatic shifting of the tail end of the machine is provided where desired. (Note illustration at right). Power requirement is moderate. Installation and upkeep costs are surprisingly low. Made in a wide range of sizes covering the capacity needs of large and small projects.

This picture shows a 2 cu. yd. Sauerman Scraper reclaiming from 200-ft. high chat pile at Tri-State zinc mine. Scraper delivers to short conveyor and 90 tons an hour of material are moved to mill without a man going near the sloughing pile.

SEND FOR NEW SCRAPER CATALOG A

SAUERMAN BROS., Inc.

584 S. Clinton St., Chicago 7, Illinois

Roof Bolting Boosts SAFETY and EFFICIENCY

These roof bolts held while timber supports failed in similar service in the same mine.

Roof bolting is accepted as improved practice in coal mines and is now under test in metal mines with apparent success. Already demonstrated are these advantages over timbering: improved efficiency, increased production, lower cost, greater safety, assured permanence, better clearance at walls and roof.

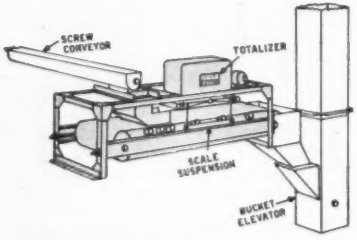
CF&I offers roof bolts with flame-cut slots and serrated wedges. Test them; see how they meet your particular conditions.

Inserting the bolt *Driving it home* *Tightening the nut*

a product of
THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
THE COLORADO FUEL & IRON CORPORATION, DENVER
WICKWIRE SPENCER STEEL DIVISION, NEW YORK

MINE ROOF SUPPORT BOLTS

THE COLORADO FUEL & IRON CORPORATION CF&I



The Transportoweigher automatically and continuously transports, weighs, indicates, integrates and totalizes tonnage.

SINTERING MACHINERY CORP.
Transportometer Division

70 PINE STREET
New York 5, N. Y.

In Africa *(Continued)*

which will be converted into 48,000 annual tons of steel.

★**Manufacture of sulphur from pyrites** may come about as the result of intensive experiments for extraction of pyrites from gold ores in the Witwatersrand. The ores may contain as much as 5% pyrite, and the cyanide residues (they would probably be worked first) contain 2% or more.

In flotation tests on a cyanide residue from the far west, the Government Metallurgical Laboratory recovered about 90% of the pyrite (about 2% of the residue) in a product containing 40% sulphur. Reagent consumption was reasonable.

In a pilot plant at the mine, recovery was more than 90% and grade was 42%. Management estimated that a plant for recovery of sulphur from 175,000 tons of slimes per month would yield a profit before amortization of $75,000.

★**Urawira Minerals, Ltd.** will get $1,640,000 under an agreement signed with the U. S. Mutual Security Agency. The moneys (Urawira will put up a like amount) will be used to expand the Mpanda mine in Tanganyika, Urawira will install a 1,000 ton mill at the Mpanda mine, and will repay DMPA in the form of lead and copper for the U. S. stockpile. Payments (and thus presumably production) are scheduled to begin by Jan. 1, 1954. In addition, the U. S. will have the right to purchase 50% of total lead and copper production from Mpanda for ten years after completion of repayment.

IN AUSTRALIA

★**First sales of gold** on premium markets have been negotiated at a price between $38.50 and $38.75. Cost of working the gold into "artistic or industrial" shapes is about $1.50 per oz. So the net from gold sold on the free market will be roughly $37 per oz. The gold producers' association, handling sales, is going slowly to test the market.

★**The federal government** has received optimistic reports on new uranium and bauxite discoveries. The uranium deposits at Rum Jungle are claimed to be among the world's richest. The bauxite discovery on Wessel Island, off Arnehm Land, is extensive; it is said to be adequate to supply all Australia's needs and leave an exportable surplus. The bauxite may be developed as feed for the Aluminum Production Commission's new plant nearing completion in Tasmania.

★**Government and industry** sources are pleased with the results of Australia's first exports of lead.

★**King Island Scheelite** is preparing to increase its output starting about

July of 1952. Recent production has been at a rate of about 25.4 tons of concentrate per week.

★**Silverton Silver Mines,** with its Umberumberka cyaniding plant nearly completed, will start production soon.

★**In Tasmania,** Montana Silver Lead is planning a large-scale development for ore production. It also plans to have its selective flotation plant in operation by June or July. Feed will be approximately 10% lead, 10 to 12 oz. silver, and 1.7% zinc. Gravity production will also continue; tailings are being saved for retreatment.

IN EUROPE

★**A/S Titania,** a Norwegian company, plans to construct a new iron works at Sokndal. The plant will use a new method for extracting the 30%-iron content of ilmenite. Output is expected to be about 30,000 annual tons of pig iron if enough electricity is available.

★**In Spain,** Empresa Nacional Adaro plans to exploit a new gold discovery at the rate of 600 tons daily; that rate is expected to produce 1,000 kilograms of gold per year (roughly $1-million). The deposit is in a region along the southern Mediterranean coast; it is estimated to contain 2.5-million tons of ore.

★**Sweden** has begun to improve her section of the Kiruna-Narvik railway: Triple tracks are to be laid at the 12 stations between Kiruna and Abisko and the signal system is being improved. Result will be that trains will be able to pull 70 cars instead of 44, as formerly.

IN LATIN AMERICA

★**A railroad to Cerro Bolivar** will result from a contract which Orinoco Mining Co. has let to Morrison-Knudsen de Venezuela, an affiliate of the Boise firm. The 90-mi. road will run from Puerto Ordaz, on the Orinoco, to Cerro Bolivar. It will be standard-gage Class A construction. Morrison-Knudsen's contract also includes construction of a highway from Puerto Ordaz to Cerro Bolivar. Work is to start immediately.

★**Export-Import Bank** approved a loan of $580,000 to Compagnie Aramayo de Mines en Bolivie to assist in financing expansion of the Pacuni tungsten mine in Bolivia. The loan will be used in large part for the purchase of U. S. mining and milling equipment, and in some part for other development costs. In return, Aramayo will sell the tungsten it produces between 1952 and 1954 to the United States Emergency Procurement Service.

★**French interests,** which have been contesting with United States interests for the right to work Brazilian monazitic sands in the state of Espirito Santo, appear to have won the battle. A recent report states that Orquima S. A., subsidiary of Societe des Terres Rares, has won the approval of the Brazilian Government, and is processing sands in its plant at Sao Paulo. The American interest was Foote Minerios Ltda., subsidiary of Lindsay Light & Chemical Co.

★**Johns-Manville of Canada** has joined hands with Eternit Colombiana in formation of a company to explore long-fiber asbestos deposits in Colombia. The exploration company is capitalized at about $400,000. Deposits are near Campamento, Anori, and Valdivia in the Antioquia Department. Shallow exploration to date has revealed smooth, tough, long-fiber asbestos equivalent to the grade which is now selling for about $1,500 per metric ton.

★**Mexico has nationalized the atom:** A presidential decree allows exploitation of uranium, thorium and other atomic materials which automatically go into national mineral reserves. Uranium, thorium, and other atomic-bomb materials automatically go into the national reserve upon discovery. A presidential decree allows exploitation

Built to be forgotten!

You can't beat *WARREN* Cast Iron Pipe for strength, toughness and the resiliency so necessary for maximum life . . . .

You can't beat *WARREN* Cast Iron Pipe for ease of installation . . . pipe and fittings are available in all sizes from 2" to 84" with all types of joints . . . .

You can't beat *WARREN* Special Castings to meet your requirements for non-standard patterns . . . .

Specify WARREN CAST IRON PIPE...

Warren FOUNDRY & PIPE CORP.
55 LIBERTY STREET, NEW YORK 5, N. Y.
Bell & Spigot Pipe • Flange Pipe • Mechanical Joint Pipe
Flexible Joint Pipe • Short Body Bell & Spigot Specials
WARREN PIPE CO. OF MASS. INC. 75 FEDERAL ST. BOSTON, MASS.

95 Years of Continuous Service

WEIGH WITHOUT STOPPING
WHILE YOU CONVEY

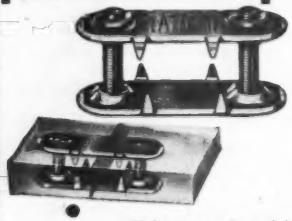
Yes, weigh and record with the —MERRICK
WEIGHTOMETER

The Merrick Weightometer provides a continuous, automatic, accurate weight record at any designated point in the mill, while material is in motion on conveyor. It weighs without interrupting conveyor service.

Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

MERRICK SCALE MFG. CO. PASSAIC N. J.

PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS



Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of [illegible] 1/4" to 1 1/2" thickness. Write for Catalog Sheet.

Booth 317, Mining Cong. Conv., Cleveland, May 14-17

ARMSTRONG BRAY & CO.
5323 Northwest Highway, CHICAGO 30, U. S. A.

In Latin America *(Continued)*

under the control of the Mining Stimulation Commission. Ore and ore metals must be sold to the Mexican Government on the basis of the International price. Contractors must be Mexican nationals, or, if companies, must have a Mexican majority.

★**Taking gold coin** out of Mexico is no longer a crime, according to a decree handed down by the National Supreme Court. The ruling countermands presidential decrees of 1944 and 1945 which made export smuggling a crime punishable by heavy fines, long imprisonment, and confiscation of the gold.

★**Mexican silver output** slipped in 1951; it was down to 42-million oz.

IN THE PHILIPPINES

★**The new 1,000-ton concentrator** of the Acoje Mining Co. has started production. An output of some 15,000 tons of chromite concentrates per month is anticipated, with sales value approximating $400,000. The product will be exported principally to the United States but contracts will also be closed with Japanese and European buyers. About 20,000 tons were shipped in 1951 even though most of the ore was stockpiled awaiting completion of the mill.

★**Lepanto Consolidated** easily maintained its dominant position for the year as the most profitable mine in the Philippines. With declaration of an extra year end dividend, a total of $3-million in dividends were distributed during the year, a larger amount than was paid by all the gold mines in the Islands.

★**The Toledo copper mine,** some 33 kilometers from Cebu City, is being vigorously prospected by the Mindanao Mother Lode Mining Co. This property had a small prewar production. Copper veins, although of narrow width, have a high metal content. The mine was originally opened up by tunnels. Present high copper prices may permit the property to be operated profitably.

★**Development work on the 1,350-ft. level** of the Mindanao Mother Lode has proved somewhat disappointing. While the vein is still strong, gold content has declined along with the associated copper and lead. The pyrite content has increased markedly. On the 1100, 1200, and 1300 levels the sensationally high gold values that characterized the upper levels are encountered only occasionally. Monthly production has been declining in value. In November the gross was $152,217 from milling 9600 tons, with an average value of $15.80 per ton. In December, from the same tonnage milled, gross recovery totaled $144,600 with the average value per ton $15.10. The company omitted the dividend for the last quarter of 1951 in order to conserve cash for future expenditures as well as to finance development at the Cebu copper project. Pumping expense is high, with the old mine handling 2900 gpm, at a cost of about $4 per ton mined.

★**Surigao Consolidated** ended a highly profitable year in 1951. Mine production was at an all-time high in December, reaching $171,150 from milling 11,368 tons averaging $15.20 per ton at the statutory price. The 700-ft. level looks particularly good. The vein carries zinc, lead, copper, and gold. Recovery of all the metals has presented some difficult milling problems.

★**A new copper prospect** in Oriental Misamis province, Mindanao, has been examined by Bureau of Mines engineers. The outcrop is reported to show 6 in. of cuprite and 15 ft. of copper-iron ore averaging about 2½% copper. The vein structure is strong and can be traced on the surface for 200 ft. Inaccessibility is the principal handicap. Engineers have long been of the opinion that this section of Mindanao had interesting possibilities but the war intervened when interest was at its highest. Government engineers are searching diligently for commercial deposits of sulphur but thus far without success.

★**Milling rate** at the Benguet-Balatoc mill is maintained about 75,000 tons a month but ore is of a little better grade recently, averaging about $7.80 per ton. Operating conditions are satisfactory.

★**Preliminary figures** indicate that gold production in the Philippines in 1951 reached a new post-war peak and approximated over 406,000 oz. from the straight gold mines, without including by-product gold. This was about 70,000 oz. more than in 1950. The value of the production at the statutory price was about $14,250,000 but the gold mines actually received about 50% more, thanks to the premium received in the open market in Manila for gold bullion. The government continues to permit sales of 75% of the production at the best price obtainable, while requiring 25% to be turned in to the Treasury at the statutory price. The year closed with the gold mines receiving about 118 pesos per oz. in the open market but the price advanced to 121 pesos at the end of January. Inclusion of two new gold producers, Itogon in the Baguio district and Coco Grove in the Paracale field, that began operations in October, contributed to the total output by over 10,000 oz.

★**Consolidated Mines** shipped 30,390 tons of chromite ore in December, establishing a new monthly record for 1951.

World's largest deep frame jaw crusher is protected by Farval lubrication

FARVAL—*Studies in Centralized Lubrication* No. 133

IN the next few months, this mammoth machine will crush three million tons of diorite. Largest deep frame jaw crusher ever built, it is operating on the Detroit dam project in western Oregon.

A highly publicized feature of this project is the cooling of all the aggregates used in the concrete construction. The builder of this crusher insured that the bearings in his equipment would always run cool, too. He equipped it with a Farval Centralized Lubrication System.

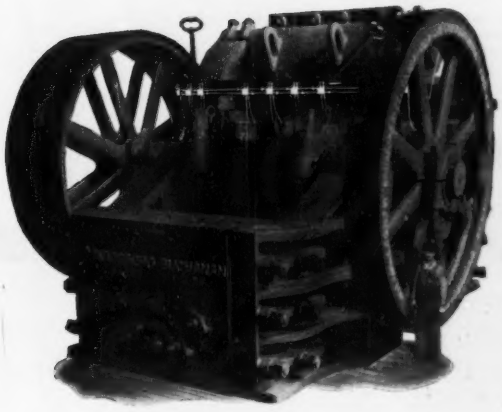
With Farval on the job, no special oilers are needed, lubricant consumption is reduced, bearing life is extended indefinitely and shutdowns for oiling or bearing replacement are eliminated. In short, Farval insures that the crusher can work day in, day out, without interruption from overheated bearings, in doing its part to see that the great Detroit dam is finished according to schedule.

Farval is the original Dualine system of centralized lubrication for industrial equipment, proved practical in 25 years of service. The Farval valve has only two moving parts—is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. Through its full hydraulic operation, the Farval system unfailingly delivers oil or grease to each bearing—as much as you want, exactly measured—as often as desired. Indicators at all bearings show that each valve has functioned.

In or near your city there's a Farval engineer, ready to discuss your lubrication problems and suggest a proper system to meet your particular needs.

The Farval Corporation, 3281 East 80th Street, Cleveland 4, Ohio.

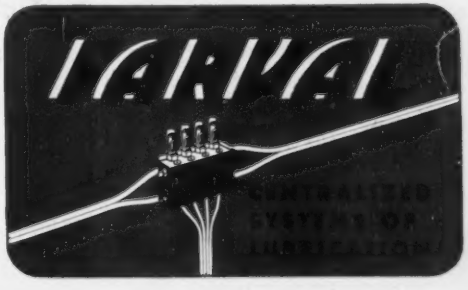
Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION—*Wherever you see the sign of Farval—the familiar valve manifolds and dual lubricant lines—you know equipment is properly lubricated. Thus you can see there will be no bearing trouble on this Birdsboro-Buchanan crusher.*

This giant weighs 275 tons, stands 18 feet high, has a 66- x 84-inch jaw opening. It handles feed from a 5-cu.-yd. shovel, discharging a 14-inch product at the rate of 800 t.p.h. It is one of more than fifty thousand industrial machines whose bearings are protected by Farval.

Photo above by courtesy Birdsboro Steel Foundry & Machine Co.



Your choice of COLOR

IN HARD BOILED* Safety Hats

STRONGER-THAN-STEEL FIBERGLAS

crowns offer unlimited choice of vivid, permanent colors... with color molded all the way thru the safest crowns ever built. Shock-resisting ribbed design also available in aircraft grade aluminum.

Write for Full Color Circular

SAVE MONEY ... save time! One size fits all heads . . . reduces inventories. Fully adjustable headband and hammock; can be changed in *six seconds*. Self-shaping and air-cushioned for comfort.

EVERYTHING BULLARD IN SAFETY *T. M. Reg. HARD BOILED

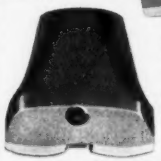
Distributors in principal cities

E. D. BULLARD COMPANY

275 EIGHTH STREET, SAN FRANCISCO, CALIFORNIA

BRUNNER & LAY *tungsten carbide* **ROK-BITS®**

greater footage



faster drilling longer life

• Use Brunner & Lay Rok-Bits to give you the most for your money from man and machine. Brunner & Lay Rok-Bits give full support of the carbide to absorb impact on every stroke. Channel design affords maximum clearance. To save money and time, ask your dealer for Brunner & Lay Rok-Bits . . . or write to us.

INTRA-SET AND HOLLOW DRILL STEELS
MOIL POINTS • CLAY SPADES

Brunner & Lay, Inc.

general offices and main plant
9300 KING STREET • FRANKLIN PARK, ILLINOIS

affiliated plants and warehouses
2425 East 37th Street
Los Angeles 11, Calif.
150 Leslie Street
Dallas, Texas

the reliable, leading source of supply since 1882

FOR **ROUGH-TOUGH** CORE DRILLING...

THE NEW ACKER KR SHOT CORE DRILL

For rough-tough shot core drilling, Acker's new KR shot core drill is tops in design and performance! Using inexpensive steel shot for cutting, the KR reduces bit servicing problems and recovers large cores (up to 20" in diameter) quickly and economically. Gasoline, kerosene, diesel, air or electric motors will power the new KR. Your choice of trailer, skid or truck mounting.

For more information, write today for free illustrated Bulletin 19 EMJ.

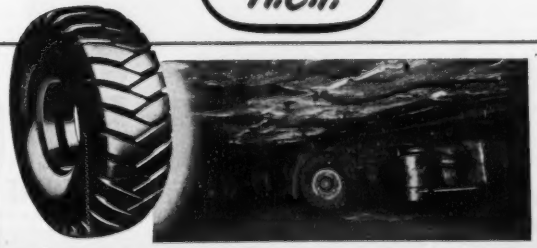
ACKER DRILL CO., INC.
SCRANTON 3, PA.
Manufacturers of diamond and shot core drills and supplies.

Up steep hills—on loose gravel and sand piles over sharp rocks—slush, mud, gravel—out and over the highway **GENERALS** deliver more loads

Faster! Easier! At Lower Cost!

GENERAL L. C. M—for most work off-the-road. Massive tread and thick, tough shoulders develop extra traction. Extra wear on tough, jagged surfaces. Stronger rayon cord body with more natural rubber built into its shock-absorber design.

GENERAL H. C. T.—for more work on-the-road. Thick, saw-tooth tread supported by broad, angled shoulder cleats develop extra traction. Smoother rolling, quicker stopping. More original and more recap miles.



GENERAL UNDERGROUND MINING TIRE

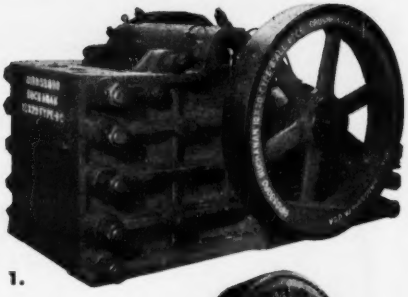
This specially designed, ruggedly built, thick-shouldered mining tire will assure more uninterrupted hours of work. More maneuverability.

REQUEST GENERAL TIRES ON YOUR NEW EQUIPMENT

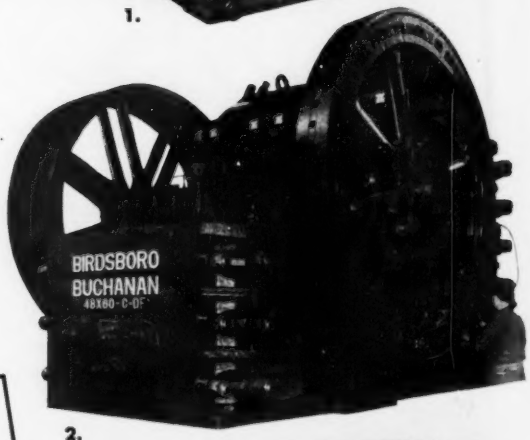
For Your Tough Crushing Assignments— For Greater Tonnages at Lower Cost—

THE NAME IS

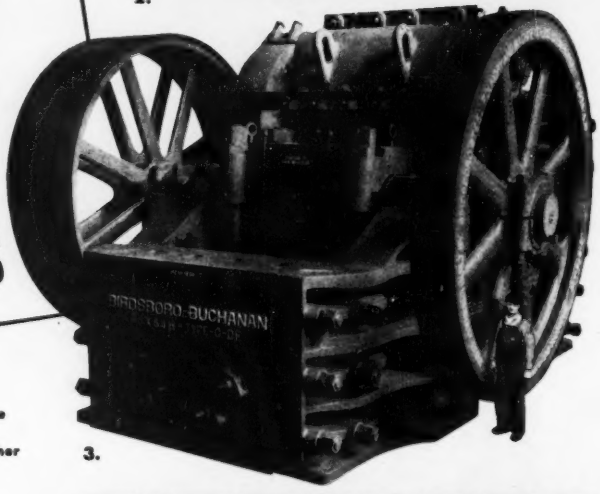
BIRDSBORO BUCHANAN JAW CRUSHERS



1.



2.



3.

1. **Small—but the strongest crusher of its size —12" x 20".**
2. **Birdsboro-Buchanan Deep Frame Jaw Crusher —Size 48" x 60".**
3. **Largest Deep Frame Crusher ever built —Size 66" x 84".**

Canadian Representative & Manufacturer
JOHN INGLIS CO. LTD.
TORONTO, CANADA

World-Wide Agent Representation. Contact home office for nearest representative.

CR-3-51-R

BIRDSBORO
STEEL FOUNDRY & MACHINE CO.
Birdsboro, Penna.

BIRDSBORO BUCHANAN JAW CRUSHERS

Designers and Builders of:
Crushing Machinery • Rolls • Steel Mill Machinery
Hydraulic Presses • Special Machinery • Steel Castings

Choose between them and get 30% to 100% more air

Coppus Blowers are designed for two different types of mine ventilation requirements: the centrifugal Coppus **VENTAIR** is for long pipe lines; the propeller-type Coppus **VANO** for shorter lines . . . the correct selection will give you from ⅓ more to twice as much air — for a given power consumption — than an ordinary all-purpose fan.

Available for either compressed air or electric motor drive, both can be used as blowers or exhausters and are obtainable in capacities up to 90,000 CFM.

Only Coppus makes both these types, one of which will give you better, more economical mine ventilation . . . know them by the "Blue Ribbon" that symbolizes the engineering and production skill behind every Coppus product.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corporation, Worcester 2, Mass.

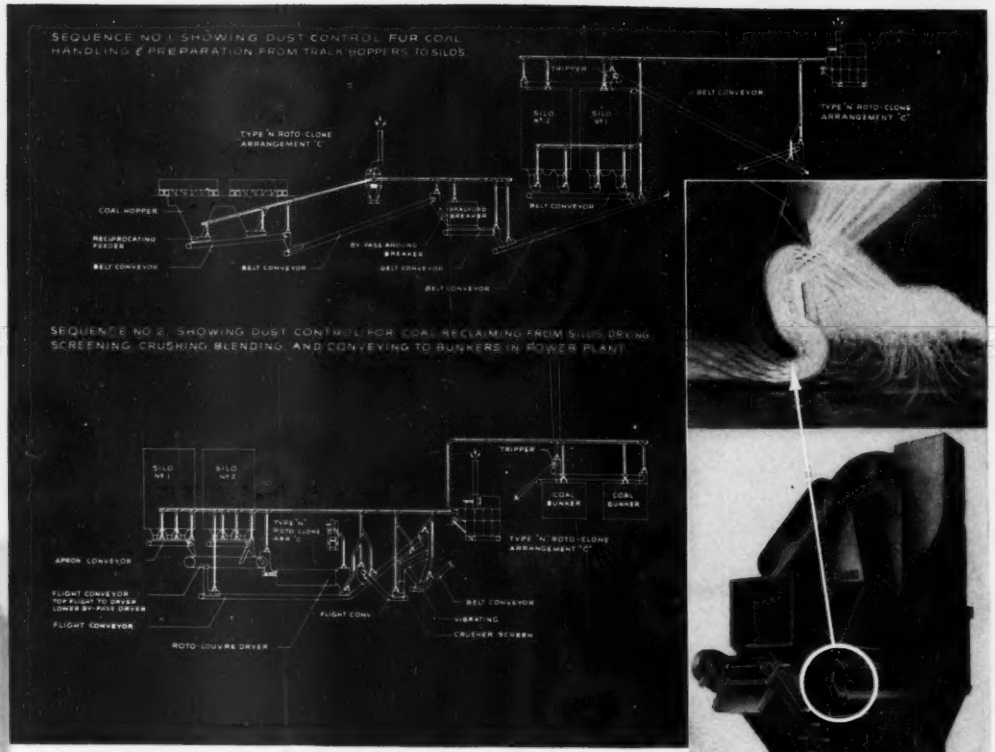
COPPUS ENGINEERING CORPORATION
283 Park Avenue, Worcester 2, Mass.

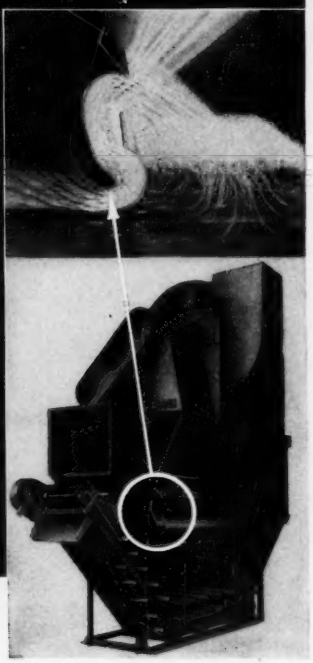
Please send.....Bulletin 130

Name.....

Company.....

Address.....





Cutaway of ROTO-CLONE Arrangement C Hydro-Static Precipitator.

ENGINEERED dust control for efficient handling and preparation cycles

AAF ROTO-CLONE proves the answer to lower operating costs.

ROTO-CLONE high efficiency dust control soon proves that *clean air* is a sound investment in mechanized mining operations. The flow sheets above show ROTO-CLONE* applications to coal handling and preparation cycles. However, these are typical of installations in many types of mining operations.

Engineered dust control saves operating costs in several ways. Important factors are reduced maintenance and clean-up expense, improved job morale, and increased mechanical efficiency. ROTO-CLONES also are used extensively in the salvage of material . . . particularly high value fines . . . from milling, sampling and sintering operations.

The many types, sizes and arrangements of ROTO-CLONES have solved almost every dust problem in the mining cycle. If dust sources are adding to your operating costs, write us for Engineering Bulletin No. 277 containing full details on Type N ROTO-CLONE.

* * *

**ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

American Air Filter
COMPANY, INC.
193 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California

In Mines and Quarries "EUCS"

HAUL MORE TONS AT LESS COST

Built for tough off-the-highway hauling, Rear-Dump and Bottom-Dump "Eucs" have stepped up production and cut hauling costs on hundreds of open pit mining and quarry operations.

Euclids have proved their efficiency and long life in hauling a wide variety of materials . . . coal, ore, rock, overburden and other heavy excavation. Bottom-Dumps are powered by diesel engines of 190 to 300 h.p. . . . loaded speeds up to 34.4 m.p.h. . . . available in 20 to 40-ton capacities. Rear-Dump "Eucs" have travel speeds up to 36.3 m.p.h. . . . powered by diesel engines of 125 to 400 h.p. . . . range in capacity from 10 to 34 tons.

Your Euclid Distributor has performance data on jobs similar to yours. Ask him for a Euclid hauling cost estimate — there's no cost or obligation.

The EUCLID ROAD MACHINERY Co. • CLEVELAND 17, OHIO

EUCLIDS *Move the Earth*

Sulphur

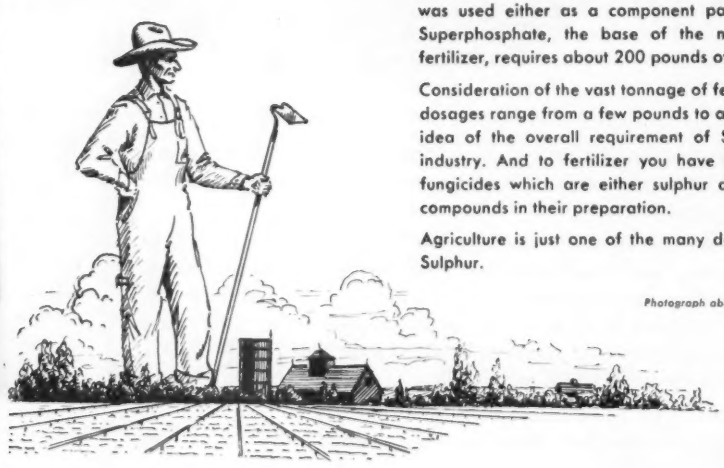
Thousands of tons mined daily, but where does it all go?

THE DEPARTMENT OF AGRICULTURE reports that in 1950 some 336,000,000 acres of land in the United States were under crop cultivation. That's a lot of acreage.

But where, you might ask, is the connection with Sulphur? Fertilizer, to take just one phase of agriculturally-used chemicals in which Sulphur was used either as a component part or as a processing element! Superphosphate, the base of the most widely used manufactured fertilizer, requires about 200 pounds of Sulphur for every ton produced.

Consideration of the vast tonnage of fertilizer used in agriculture — and dosages range from a few pounds to a ton or more per acre — gives an idea of the overall requirement of Sulphur for this one division of industry. And to fertilizer you have to add all the insecticides and fungicides which are either sulphur derivatives or have used sulphur compounds in their preparation.

Agriculture is just one of the many destinations of great tonnages of Sulphur.



Photograph above shows our loading dock at Galveston, Texas

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

SERVICE IS DUCK SOUP ON

KYSOR

"Built to last" EQUIPMENT

Sturdy construction and finest craftsmanship make KYSOR Equipment easy on maintenance and simple to service.

Complete service instructions are available in KYSOR Service Bulletins such as those illustrated. Authorized KYSOR Distributors are also equipped to service all types of KYSOR SHUTTERS and Controls.

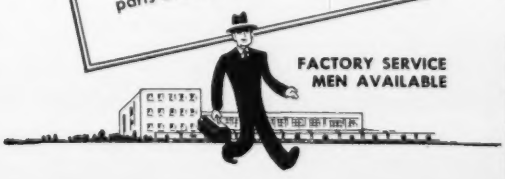
Please enclose shutter serial number when requesting service material or replacement parts.

KYSOR HEATER CO. - Cadillac, Mich.

FACTORY PARTS EXCHANGE PLAN

KYSOR maintains a rapid-service parts exchange department for customer convenience and savings. Exchange Plan includes Shutterstats, Alarmstats, Pressurestats, Air Filters, Air Cylinders, Vacuum and Hydraulic Controls.

Write KYSOR, Cadillac, Michigan, giving parts serial numbers for parts exchange information.



FACTORY SERVICE MEN AVAILABLE

Check ... mail to KYSOR Heater Company, Cadillac, Mich. Service information will be promptly forwarded to you.

Air Control Shutters ☐ Vacuum Control Shutters ☐

Hydraulic Control Shutters ☐ Parts Exchange Plan ☐

For Shutter Parts List add Serial No. _____

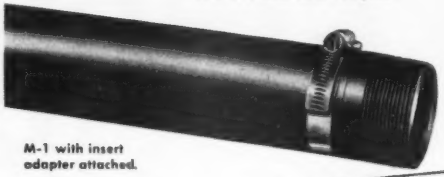
Yardley THE PLASTIC MINE PIPE that won't *rot, rust, corrode*

A TYPE FOR EVERY PURPOSE

M-6 with cement-type sleeve coupling.

M-2 flexible type.

M-6-T/C with male adapter.



M-1 with insert adapter attached.

Whatever the need . . . for cold water or corrosive liquids, suction or discharge . . . there's a Yardley Plastic Pipe for the job.

Made from rigid or flexible light-weight material. Acid and alkali resistant. Won't rot, rust or corrode. Produced in a full range of pipe and tubing sizes, ½" through 6". Complete line of standard fittings and adapters. Easier to install, more economical to handle.

Send for chemical resistance charts.

YARDLEY PLASTICS CO.
142 Parsons Ave. • ADams 9315
Columbus 15, Ohio

YARDLEY M-1 and M-2 FLEXIBLE PIPE SPECIFICATIONS

PIPE SIZE	NOMINAL O. D.	NOMINAL I. D.	CALCULATED B. P. P. S. I.	APPROXIMATE WT. PER FT.	NORMAL SHIPPING LENGTHS
½"	.820	.620	540#	.092	400' Coils
¾"	1.080	.840	350#	.141	400' Coils
1"	1.340	1.100	200#	.179	300' Coils
1¼"	1.640	1.360	200#	.263	300' Coils
1½"	1.900	1.610	200#	.357	250' Coils
2"	2.375	2.067	170#	.434	200' Coils
3"	3.300	3.068	165#	.899	100' Coils
4"	4.500	4.026	150#	1.220	25' Straight
6"	6.675	6.065	115#	2.400	25' Straight

YARDLEY M-6 AND M-6-T/C RIGID PIPE SPECIFICATIONS

PIPE SIZE	APPROXIMATE WT. PER FT.	NOMINAL I. D.	NOMINAL O. D.	CALCULATED BURST PRESSURE P.S.I. AT 80° F.
½"	.053	.476	.600	700
¾"	.080	.715	.855	625
1"	.138	.970	1.140	550
1¼"	.20	1.230	1.420	525
1½"	.32	1.510	1.730	490
2"	.45	2.00	2.250	400
3"	.555	3.000	3.250	375
4"	.880	4.000	4.300	342
6"	1.940	6.000	6.440	335

M-6 and M-6-T/C recommended for working pressures up to 20% of calculated bursting pressures where temperatures do not exceed 125°. For M-1 and M-2 working pressures, use 60% of calculated burst.

FLEXIBILITY

that pays off

IS OUTSTANDING FEATURE OF THIS

JEFFREY BELT CONVEYOR

● An economical means of advancing transportation is provided with this Jeffrey 64-A Sectional Belt Conveyor with its intermediate sections.

It is frequently used where ore and other material must be moved continuously over long distances . . . has been operated in lengths exceeding 3,000 feet.

The Jeffrey 64-A Belt Conveyor is available in three belt widths—30, 36 and 42 inches. Range of speeds vary from 175 to 500 feet per minute—capacities up to 18 tons per minute, depending upon speed and size of belt.

While built in standard units for quick, low cost extension of the haulage system, each conveyor is engineered to meet your conditions. For fast, economical transportation—above or below ground—consult a Jeffrey Engineer.

THE JEFFREY MANUFACTURING COMPANY

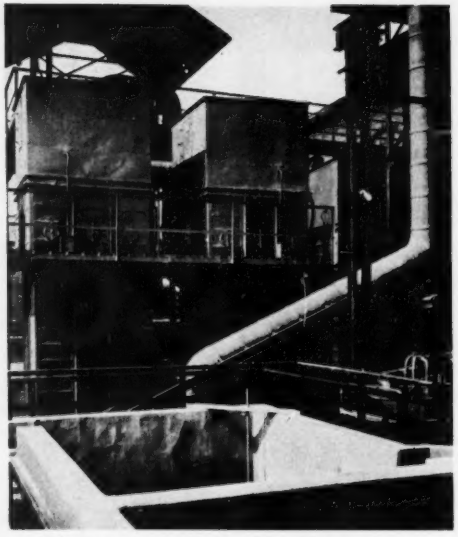
974 North Fourth St., Columbus 16, Ohio

Established 1877

Complete line of Material Handling, Processing and Mining Equipment

This 'dust' man can help you...

Solve Stack Dust Problems



Buell 'SF' Electric Precipitator for collecting acid mist.

This industrial 'dust' man assures peak efficiency in Dust Recovery

The Buell organization of industrial 'dust' men is devoted solely to the design and construction of dust collection and dust recovery equipment that will most efficiently and economically solve your plant's specific Stack Dust problem.

For more than 18 years we have been doing just this for all American industry. Every Buell installation is a custom-designed system, engineered to hold stack dust discharge down to the practical limits which assure new profits, improved product and/or process, better plant-community relations, higher levels of employee morale.

For full information about Buell's ***3 basic systems*** of dust collection, and how one can be applied to the solution of your stack dust problems, write today. Ask for the new, informative bulletin titled, "The Collection and Recovery of Industrial Dusts." Do it now. Buell Engineering Co., Dept. 13-C, 70 Pine Street, New York 5, N. Y.

ELECTRIC CYCLONIC

buell®

HIGH EFFICIENCY CYCLONES • ELECTRIC PRECIPITATORS
TYPE 'LR' COLLECTORS • LOW DRAFT LOSS COLLECTORS
SPECIAL PURPOSE COLLECTORS • DUST HOPPER VALVES

ENGINEERED EFFICIENCY IN DUST COLLECTION

WIRE ROPE

This is the most economical rope we've ever made for mining

ROEBLING is the best known name in wire rope. That's partly because we were the first wire rope maker in America. But more than that, we've always led in developing better wire and better rope for every purpose.

Today's Roebling Preformed "Blue Center" Steel Wire Rope is the miners' best choice for efficiency and long life. This rope has *extra* resistance to crushing and abrasion . . . stands up under rough going. It saves you time and cuts costs.

There's a Roebling wire rope of the right specification for top service on any job. Call on your Roebling Field Man for his recommendations. John A. Roebling's Sons Company, Trenton 2, N. J.

ROEBLING

ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 701 ST. CLAIR AVE, N. E. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, N. J.

Triple-alloy steels containing nickel offer designers the following *triple* advantages:

1. OUTSTANDING PERFORMANCE—Strength and toughness, resistance to wear, fatigue or shock to meet a wide range of requirements, as dictated by design.
2. RELIABILITY—based on consistently uniform response to heat treatment.
3. ECONOMY—resulting from standard compositions precisely graded to match the engineers' needs.

Service records established by triple-alloy steels over a period of years show that they are giving excellent results in many diverse and exacting applications.

The many standard combinations available permit accurate and economic selection for specific uses.

Because of their many advantages, these triple-alloy steels warrant your careful consideration when planning new or improved designs. We shall be glad to furnish counsel and data upon request.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street New York 5, N.Y.

Using the RIGHT Wire Rope for the Job?

You'll get longer service life from wire rope if you do. Here are some points to keep in mind when you're selecting wire rope for any equipment . . .

STRENGTH

Don't send a boy to do a man's job. Make sure the wire rope you order has enough strength to take care of the maximum load—*plus* a necessary safety factor.

FLEXIBILITY

If your ropes undergo repeated bending over small sheaves, you'll need a flexible rope with maximum resistance to bending fatigue. Two things increase flexibility—smaller wires and preforming.

ABRASION RESISTANCE

Lang lay ropes, when properly installed, and constructions with large outer wires will help extend the service life of drag lines and other wire ropes that are subject to severe abrasive wear.

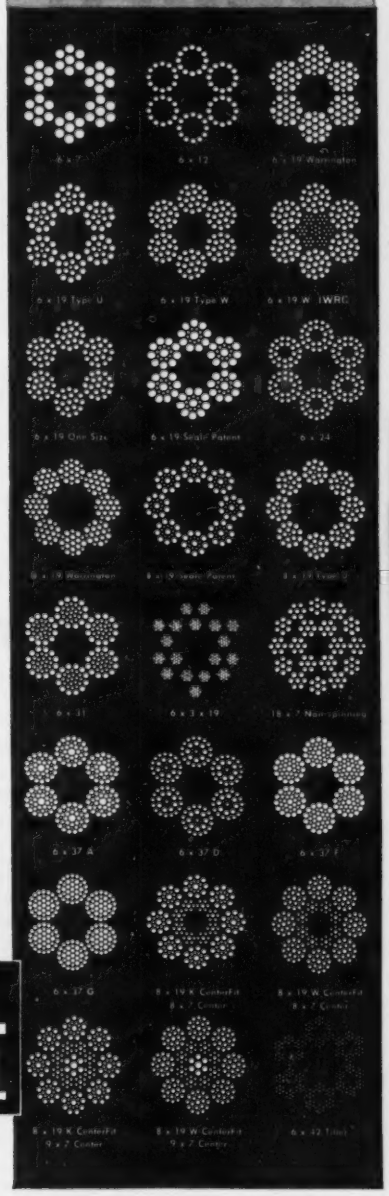
RESISTANCE TO CRUSHING

An independent wire rope center gives outside strands the support necessary to withstand crushing and distortion—large outer wires help spread the load over a greater area.

When you're looking for ways to cut operating costs, why not enlist the help of your nearest J&L Wire Rope representative? He'll help you select the *right* balance of these wire rope properties to get the longest service life on your specific type of equipment and operating condition.

Through years of research and actual operation in the field, J&L has developed a complete line of wire rope sizes and constructions. You'll find it profitable to cash in *NOW* on J&L experience and manufacturing know-how.

Select a Wire Rope that Fits Your Equipment Needs



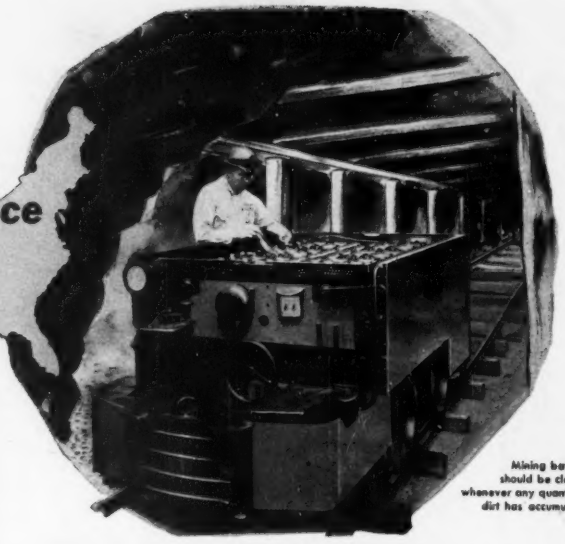
J&L STEEL

JONES & LAUGHLIN STEEL CORPORATION

401 Jones & Laughlin Building • Pittsburgh 30, Pennsylvania

GOULD

Plus-Performance Plan



Mining batteries should be cleaned whenever any quantity of dirt has accumulated.

GIVES YOU

THIS TIMELY TIP—

CLEAN BATTERIES LAST LONGER!

Because battery cleanliness prevents external current leakage and grounds, regularly scheduled cleaning is essential for maximum battery service. Information on proper battery maintenance is available to you through the GOULD PLUS-PERFORMANCE PLAN—a complete system of manuals, articles, specifications, bulletins, charts and graphs dealing with this and practically every other battery problem.

GOULD PLUS-PERFORMANCE PLAN material tells you and shows you how to select, charge and handle, maintain and determine the condition of your batteries . . . and it's FREE, without obligation! Use it and you can extend battery service as much as 50%! Send today for booklet explaining the plan.

The Gould "Thirty" with "Z" Plates—America's Finest Mining Battery

HERE'S HOW TO CLEAN YOUR BATTERIES

Batteries should be kept clean and dry. When cleaning be sure all vent plugs are in place and tight. Wash batteries with water, then blow off excess and dry with compressed air. Neutralize acid on covers and other parts of the battery with ammonia or baking soda at least once a month. Terminals and connectors should be cleaned with baking soda and water. Lead plated connectors and terminal lugs should never be scraped—scraping damages the lead plating and exposes the copper to corrosion. Use No. 00 sand paper or suede brush for such cleaning.

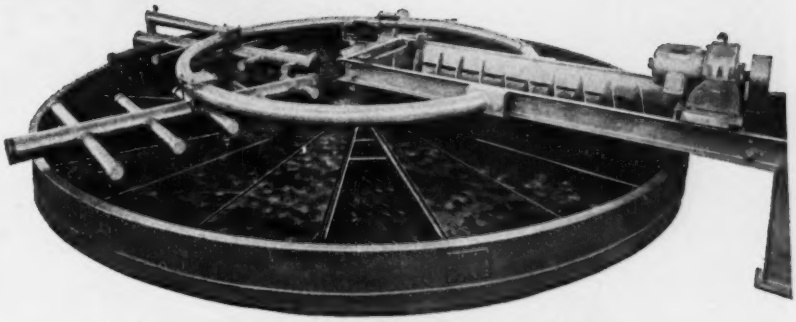
GOULD

STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries

OLIVER



Horizontal Filter

All Flow is Downward Aided by Gravity

Oliver Horizontal Filter
Scroll Discharging Cake

AND every operation on the Horizontal Filter that needs to be seen can be seen:

- feed
- cake formation
- rate and effectiveness of dewatering
- direction and distribution of wash
- cake discharge

Nothing of operating importance is hidden.

The Horizontal Filter handles pulps with certain crystalline or fibrous solids or where they tend to settle rapidly. While this filter and the Dorrco somewhat complement one another, the Horizontal offers certain special advantages. It provides exceptionally high capacity and excellent washing. It can handle big tonnages.

If you have a product in the classification outlined above, that requires dewatering or washing, tell us about it in detail. We'll be glad to recommend the best filter to bring about the results you want.

The important fact to keep in mind is that, including the Horizontal and Dorrco, we have four distinctly different continuous vacuum filters for handling mineral products as well as several pressure type filters from which to select. And, further, in making our recommendations we call upon 45 years filtration experience in the metallic and non-metallic mining industries.

New York 18 – 33 W. 42nd St. Chicago 1 – 221 N. LaSalle St.
Oakland 1 – 2900 Glascock St. San Francisco 11 – 260 Calif. St.
Export Sales Office – New York • Cable – OLIUNIFILT

FACTORIES:
Hazleton, Pa.
Oakland, Calif.

OLIVER UNITED FILTERS inc.

WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES

CANADA
E. Long, Ltd.
Orillia, Ontario

MEXICO & CENT. AMERICA
Oliver United Filters Inc.
Oakland, Calif.

INDIA
Dorr-Oliver (India) Ltd., Bombay

EUROPE & NORTH AFRICA
Dorr-Oliver S. A. Brussels
Dorr-Oliver S.N.a.R.L. Paris
Dorr g.m.b.h. Wiesbaden (16)
Dorr-Oliver Co., Ltd., London, S.W. 1
Dorr-Oliver S.a.R.L. Milano
Dorr-Oliver, N.V. Amsterdam-C

PHILIPPINE ISLANDS
E. J. Nell Co.
Manila

HAWAIIAN ISLANDS
Honolulu
A. R. Duvall

WEST INDIES
Wm. A. Powe – Havana

SOUTH AMERICA & ASIA
The Dorr Co.
Stamford, Conn.

AUSTRALIA
Hobart Duff Pty., Ltd.
Melbourne

SOUTH AFRICA
E. L. Bateman Pty., Ltd.
Johannesburg, Transvaal

an ACCO product

The BRAND is mighty important

● This HAZARD brand on wire rope got started in 1846. It's a top brand today not because it goes back 106 years but because Hazard wire rope has kept on improving.

Hazard research and engineering has built more hours of useful work into ropes that carry this brand name. It has experimented with metals and alloys and every known lay. It is working harder than ever today improving the ropes that bear its name.

Hazard's especially proud of its LAY-SET Preformed WIRE ROPE. You can tell it by the green strand. It lasts longer and costs less to use.

ACCO

TRADE MARK

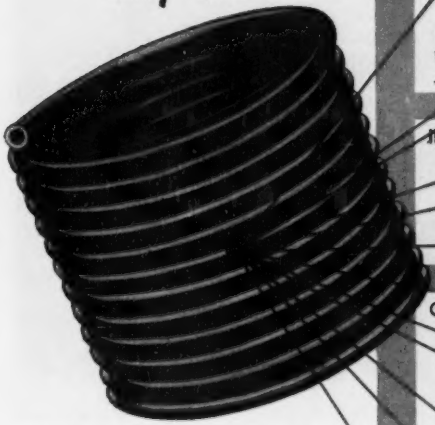
HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE

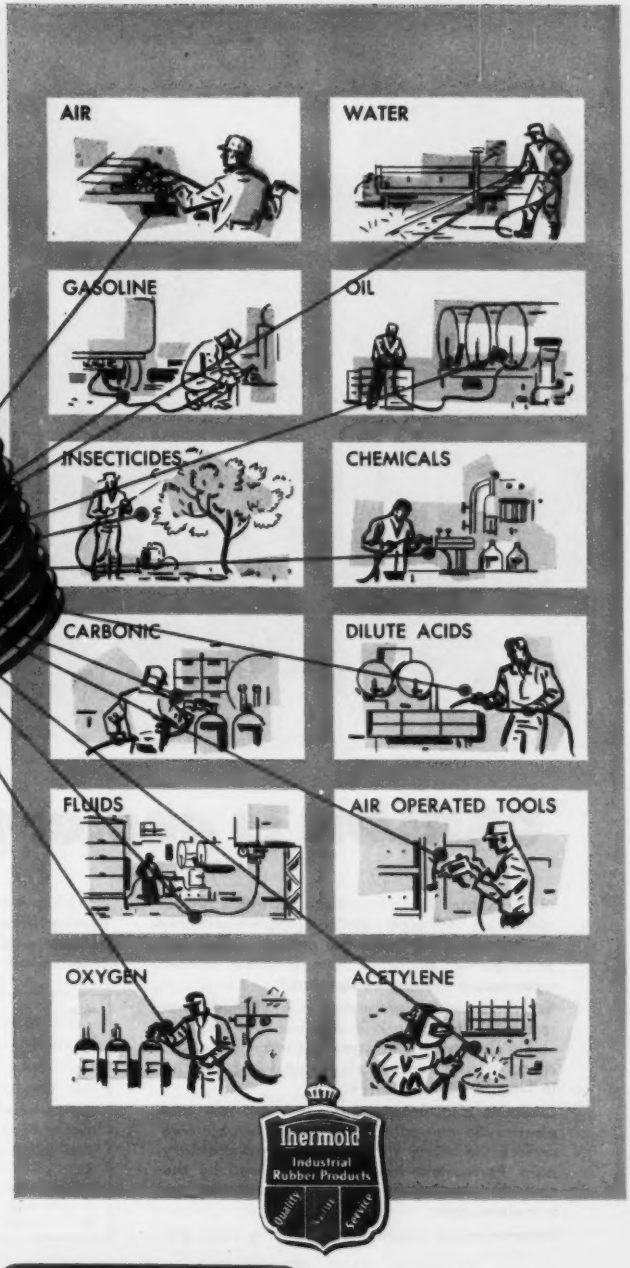
Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

makers of ACCO Registered WIRE ROPE SLINGS

Thermoid VERSICON

"the hose that does its daily dozen"





Simplify your labor, cut cost and conserve storage space by using the new Thermoid multi-purpose hose in your plant. It's Versicon . . . the amazing hose that successfully handles air, water, gasoline, oil, most insecticides and chemicals, carbonic and dilute acids and nearly all fluids . . . not to mention its application to air-operated tools, oxygen and acetylene lines. Oil proof synthetic tube, brown oil proof cover and high tensile rayon cords combine to make it durable and flexible.

VERSICON is the answer to hose problems in the stream-lined factory operation. Your Thermoid field representative will be glad to furnish full information.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packing • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company Offices & Factories: Trenton, N. J., Nephi, Utah

"CARLON is easier to handle"

"I know that for a fact because this 250-foot coil of 1½-inch pipe I am carrying weighs only 80 pounds. CARLON is the only pipe that can be handled easily in long lengths without materials handling equipment."

In addition to its light weight, CARLON is easier to handle because it is flexible and requires fewer fittings. It conforms to irregular surface contours and curving slopes and is furnished in lengths up to 400 feet.

CARLON is guaranteed against rot, rust and electrolytic corrosion and has a trouble-free service life many times longer than ordinary pipe. Permanent free flow is assured by the smooth internal surface which will not accumulate scale.

Recommended applications for this pipe are drinking water and drainage systems, ventilating lines, hydraulic sluicing, intake and exhaust piping, dredge discharge lines, low-pressure air lines, etc.

NOM. SIZE	O.D.	I.D.	EST. BURST P.S.I.	WT. LBS. PER FT.	SHPG. LENGTHS
½"	0.840	0.622	540	0.103	400 ft. coils
¾"	1.050	0.824	350	0.140	400 ft. coils
1"	1.310	1.070	200	0.181	300 ft. coils
1¼"	1.660	1.380	200	0.267	300 ft. coils
1½"	1.900	1.610	200	0.320	250 ft. coils
2"	2.378	2.070	170	0.445	200 ft. coils
2½"	2.875	2.469	170	0.680	200 ft. coils
3"	3.504	3.070	165	0.910	100 ft. coils
4"	4.504	4.030	150	1.350	25 ft. str.
6"	6.630	6.070	115	2.230	25 ft. str.

Identification Stripe: WHITE—Standard Pipe
RED—Heavy-duty Pipe

CARLON CP

Specify the Pipe with the Stripe!

STT-CP

WRITE FOR CATALOGS.

CARLON PRODUCTS CORPORATION

IN CANADA: MICRO PLASTICS, LTD., ACTON, ONTARIO
10300 MEECH AVENUE • CLEVELAND 5, OHIO

"This is where we came in . . ."

The picture that's coming up on the "news reels" now is one that we all remember. Once again Uncle Sam is a big machinery customer with first call on output.

This doesn't mean that we can't take care of our old customers . . . but it may mean that we can't do it as promptly as you've learned to expect. You may have to wait a bit longer for that new shovel, dragline or crane. But it's in a worthy cause . . . and to compensate, may we suggest that you take a little extra care to make your present equipment last?

We're not suggesting that you *pamper* the machines. Lima equipment is designed and built to take a terrific beating, and you can keep right on demanding a full day's work from every unit. But almost every piece in service gets some *unnecessary* punishment, because proper maintenance is neglected. If you focus on proper care—which every good piece of machinery deserves—you'll keep the Lima's at their working peak considerably longer.

For further information
write to
BALDWIN-LIMA-HAMILTON CORPORATION
Lima-Hamilton Division
Lima, Ohio, U. S. A.

OFFICES IN PRINCIPAL CITIES OF THE WORLD

BALDWIN-LIMA-HAMILTON

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS • TRUCK CRANES

The 1½ cu. yd. Model HM is the largest of the complete PAYLOADER line and the most powerful wheeled tractor-shovel available. Its four wheel drive and large earth-mover tires gives you fast-action traction on clay, mud or sand . . . provides crawler-like traction at far less maintenance expense, PLUS speed when you want it.

Some of its many applications are cleaning tops of coal veins, feeding stripping shovels, loading trucks, maintaining roads, moving tools and supplies . . . lifting, pushing, carrying. This special tractor-shovel operates easily and maneuvers fast because it has power-boosted steering and full reversing transmission with four speeds forward and four reverse. Double-action hydraulic rams raise and lower the booms and dump and close the bucket with finger-tip effort . . . exert tons of down-pressure for tough digging conditions.

See the Model HM in action and you'll understand why it has made a hit in pits and around tipples, yards and plants. The Frank G. Hough Co., 726 Sunnyside Avenue, Libertyville, Illinois.

Literature on the big 1½ yd. Model HM and six smaller PAYLOADER sizes, down to 12 cu. ft. bucket capacity, is yours for the asking.

Approximates Bronze-Retainer Precision

AT STEEL-CAGE COST...

Rollway's Tru-Rol Roller Bearings

Now—approach the trueness and long-life of a high-precision bearing for approximately steel-cage cost. Improve power efficiency and reduce preventive maintenance over ordinary bearings... while conserving the use of critical bronze. TRU-ROL enables you to do all this with only minimum variation from top bearing performance.

That's because Tru-Rol's contoured guide lips assure precision rolling . . . prevent roller skew with its long train of evils . . . sliding friction, end rub, power loss and reduced life expectancy. More—lubrication is evenly distributed over each roller, assuring a *thin* oil film that reduces heating and lowers friction torque.

Nation-wide Replacement Service

Rollway Bearings are available for replacement through authorized bearing distributors in principal cities. To locate, consult classified phone directories under BEARINGS.

SALES OFFICES

Philadelphia · Los Angeles · Pittsburgh · Cleveland · Houston · Chicago · Detroit · Boston

ROLLWAY BEARINGS

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

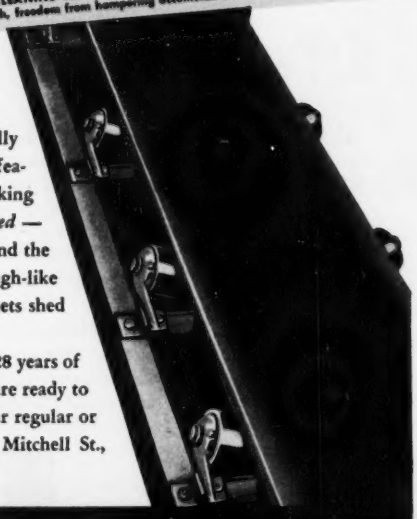
Lippmann life-sealed Ball Bearing Idlers

SHAFTS ARE FIRMLY HELD in place, yet loosening a set screw makes them simple to remove if necessary.
CLOSE ROLL SPACING provides maximum belt support, guards against pinching belt, minimizes creasing. Perfectly concentric assembly gives smooth operation with less wear and tear.
PERMANENT LUBRICATION eliminates periodic greasing. No costly catwalks. No danger of bearing opposite grease fitting not being lubricated when grease congeals. Bearings positively sealed against dirt and moisture.
DEAD SHAFT operation means larger bearing area to take radial load.
BALL BEARING action is life-time true-running, takes both thrust and radial loads. Bearings can't drag.
STUB SHAFT saves cost, saves weight, is self-aligning.
TROUGH RING on idler heads plus hooded bracket shed dirt and water—give additional protection to bearings.
HEAVY WELDED steel base with triangular section gives absolute rigidity and sheds dirt.
ALL ROLLS IDENTICAL for complete interchangeability, eliminating "less-time" fitting.
TOUGH MALLEABLE IRON support brackets are extremely rigid and accurately located.
DISHED, HEAVY-SECTION idler heads pressed and rolled into machined seat in tube give permanent alignment for bearings and idler faces.
SLOTTED BASE HOLES permit quick, easy adjustment and alignment.
SMOOTH, ROUNDED, CONTINUOUS ROLL EDGES for longer belt wear and smooth action.
SELF-CLEANING ANGLE BASE assures added strength, freedom from hampering accumulation.

Shielded for hard mining service

Meet the champion of heavy duty conveyor idlers, built specifically for hard mining service! Compare its construction, feature by feature, with *any* other and you'll agree it's the idler you've been looking for. These Lippmann Life-sealed idlers are *permanently lubricated* — the cost of catwalks and periodic greasing has been eliminated and the bearings are sealed against water, dirt and wear. In addition, trough-like rings on the idler heads shielded by hoods on the support brackets shed dirt and water away from the bearings.

Lippmann conveyors and other mining machinery are backed by 28 years of manufacturing and application experience. Lippmann engineers are ready to help you, and a card or letter will bring prompt attention to your regular or special requirements. Lippmann Engineering Works, 4623 W. Mitchell St., Milwaukee 14, Wisconsin.



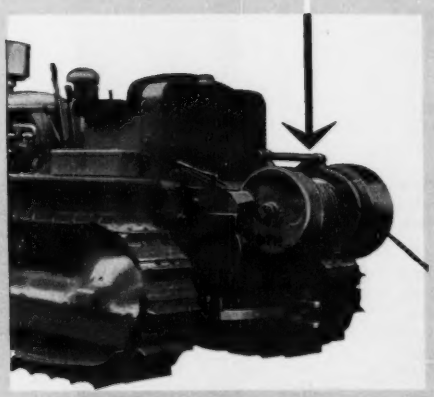
LEW LIPPMANN

CRUSHERS FEEDERS SCREENS CONVEYORS ELEVATORS HOPPERS BINS

Winching out, and simultaneously loading, a scraper outfit on a construction project in Tennessee. Hyster D7N towing winch mounted on a Caterpillar D7 tractor equipped with 75 dozer and front cable control.

...Don't let mud **bog down** your operations

HYSTER Winches have *R-E-A-C-H* and *Pull Power* for any construction job...



Hyster Tractor Winches are manufactured for use with Caterpillar D8, D7, D6, D4, D2 and DW-10 tractors. Included are Towing Winches, Worm Drive Winches, Hy-Speed Winches, Oil Well Servicing Winches, two and three drum Tractor Mounted Hoists.

Construction men all know the job insurance provided by a Hyster winch mounted on a Caterpillar diesel tractor. The winch MOVES heavy equipment; RESCUES mud-bogged equipment; INSURES against work stoppage or down-time on any project using equipment; PULLS the tractor itself out of mud or other situations that have immobilized the unit.

Hyster winches and other tractor tools are sold and serviced at more than 700 Caterpillar dealer stores around the world. Consult your dealer. Write for literature.

HYSTER COMPANY

2965 N. E. Clackamas, Portland 8, Oregon
1865 North Adams Street, Peoria 1, Illinois

MORE THAN 40,000 SATISFIED WINCH OWNERS

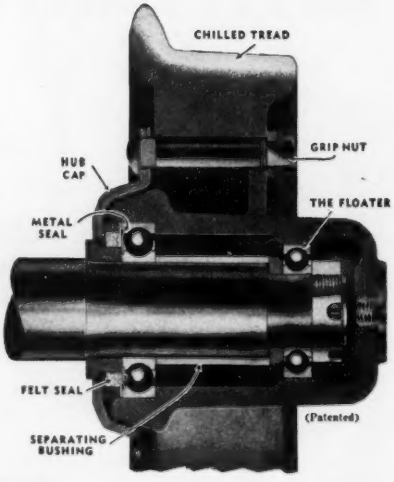
You may have a production Bottleneck HERE!

"Why didn't I discover that before!" How often this question pops up when suddenly you find a costly leak in maintenance. That's why we suggest you check your car wheel up-keep now. If you are not using S-D "Floater" Ball Bearing Wheels, your present wheels unknowingly, may be, a production bottleneck—retarding output by wasting grease, labor and power.

S-D "FLOATER" LUBRICATION SAVINGS . . . grease stays in the wheel, dust and dirt out because S-D "Floaters" have a solid closed front hub and back double seal.

S-D "FLOATERS" LABOR SAVINGS . . . any unskilled worker can remove a "Floater" wheel by unscrewing only three nuts. When wheel is off bearings always remain on axle in perfect adjustment.

S-D "FLOATER" POWER SAVINGS . . . independent engineering firm tests prove that locomotives can pull up to 50% greater loads when cars are equipped with S-D "Floaters" instead of other types of precision bearing wheels . . . a big power and time saver! For faster, cheaper hauling . . . for less maintenance . . . for longer wheel life — S-D "Floaters" are your best wheel buy! Write today for complete information. Sanford-Day Iron Works, Knoxville, Tenn.



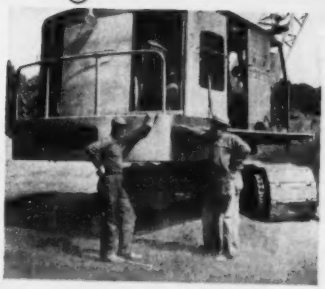
SANFORD-DAY IRON WORKS

GM Diesel
Case History No. 728-53

USER: Brown Coal Co.,
Center Point, Indiana

INSTALLATION: 38B Bucyrus-Erie 1½ yd. dragline powered by Model 6-71 GM Diesel.

PERFORMANCE: Owner reports stripping 3500 yards overburden per 10-hour day, using 3 gallons of fuel per hour. Mine produces up to 280 tons of coal per day.



THIS DIESEL

strips 350 yards an hour on 3 gallons of fuel

Co-owner K. W. Brown says, "This rig came with a General Motors Diesel and we're plenty happy that it did. Couldn't ask for better power both on this machine and the HF-10 tractor on which we've put 2000 hours in 6 months." Because of its efficient, quick-acting Diesels operation, the GM Diesel engine gets more work done at lower cost in all kinds of mining equipment—draglines, shovels, locks, tractors, locomotives, compressors, pond generators. Ask your nearest GMC Diesel distributor for the complete story.

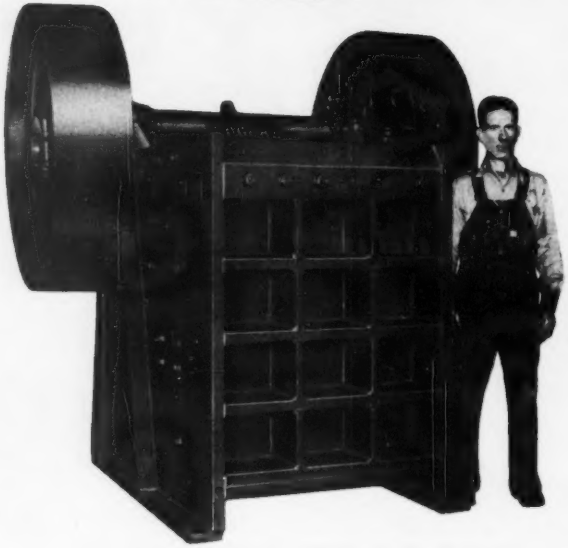
DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS, DETROIT 23, MICHIGAN

It pays to Standardize on

GM
GENERAL MOTORS
DIESEL POWER

ROGERS

means Reliability



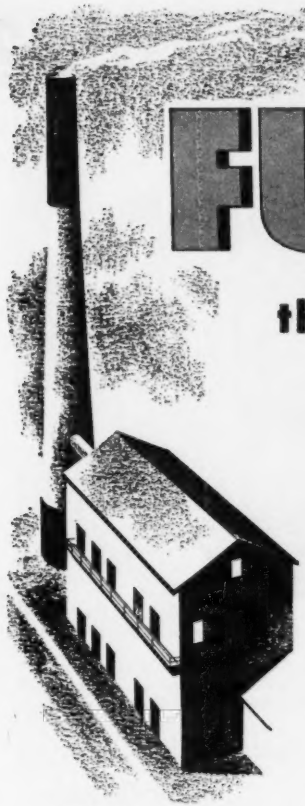
ROGERS—A pioneer name in mining machinery – builds heavy-duty welded steel frame jaw crushers from 10x16 to 32x40 sizes. The 21x36 illustrated is used in many plants crushing a wide variety of materials. The long crushing jaws make high production possible at fine settings with very low maintenance. The six foot man standing by the crusher indicates the depth of the crushing jaws. Oversize shaft, spherical roller bearings, positive dust seals, welded mortise and tenon frame joints and heavy all-steel construction throughout assure ROGERS RELIABILITY in all ROGERS Jaw Crushers.

ROGERS JOPLIN

Other Rogers Equipment

Crushing Rolls
Hammermills
Vibrating Screens
Revolving Screens
Dewatering Drags
Rock & Ore Washers
Portable Crushing Plants

ROGERS
IRON WORKS COMPANY
Joplin, Missouri



FUMEALL*

TRADE-MARK

the superior filter fabric for fume, dust and liquid filtration

SUCCESS STORY NO. 1! —From correspondence in our files.

"After nine months operation in high S.O. gas content on D+L sintering machine, Fume-All shows no loss of strength in either warp or filling... filtering characteristics are tops..."

What is FUMEALL?

FUMEALL is a combination of virgin wool and synthetic staple fibers. This combination gives the undisputedly superior filtering qualities of virgin wool plus the strength, heat, acid, alkali, and moisture-resistance of synthetic fibers.†

How long does FUMEALL last?

In actual operations, **FUMEALL** is lasting 4 times as long (and in many instances much longer) as conventional all-wool filter fabrics.

How much does FUMEALL cost?

The initial cost of **FUMEALL** is little more than any good all-wool filter fabric. Yet when measured in terms of longer life and superior performance **FUMEALL** costs far less.

How resistant is FUMEALL?

FUMEALL operates successfully in temperature ranges far beyond those permitted by conventional all-wool filter fabrics (225° to 300°), has greater fire-resistance than most synthetics. In intermittent operations, moisture absorption of **FUMEALL** is 50% or less than that of conventional all-wool filter fabrics, and shows greater resistance to acids and alkalis present in various filtered fumes and liquids.

What is the porosity of FUMEALL?

You can get exactly the porosity you want with **FUMEALL**, the right weave for your specific requirements. At present, **FUMEALL** is available in 4 different weights from most porous 14-oz. to least porous 24-oz. Finer or coarser weaves are available on special order, and **FUMEALL** can be napped or unnapped to conform to various operating conditions.

What about FUMEALL sizes?

FUMEALL is "tailored to your needs". Portland Woolen Mills will weave yardage or fabricate bags to any size and specification.

FumeAll is proving highly satisfactory for vacuum filtration in drum, disc and leaf type filters as well as bag type filters. Write or send coupon for samples and details.

INDUSTRIAL FABRICS DIVISION

Portland Woolen Mills, Inc.

P. O. Box 2620 • Portland 3, Oregon

*Patent pending

†DYNEL—a product of Carbide and Carbon Chemical Division of Union Carbide and Carbon Corp.

Industrial Fabrics Division
PORTLAND WOOLEN MILLS, Inc.
P. O. Box 2620, Portland 3, Oregon

Please send me additional details and samples of **FumeAll** suitable for
☐ fume collection ☐ dust collection ☐ liquid filtration

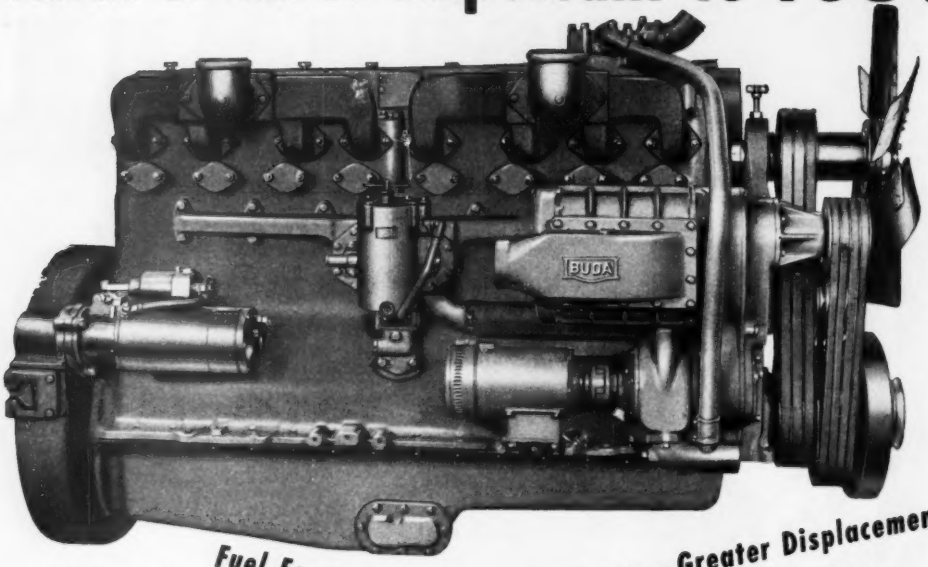
Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

Which is most important to YOU?



Fuel Economy

Buda dyna-swirl combustion burns *all* the fuel—gives more horsepower hours per gallon

More Power—Greater Displacement

Buda Diesels have 13 to 25% more displacement—more power with greater reserve

Less Maintenance and Downtime

"Clean" design—fewer parts—lower peak pressures...and Simple fuel system means less "nick-nack" maintenance

Greater Lugging Ability... More Torque

You get 10 to 17% more torque at normal speeds—less shifting—faster trips

Parts and Service

Buda Parts and Service Facilities close to your operations

Longer Life... More Hours between Overhauls

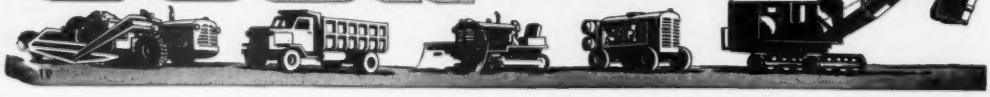
Buda Diesels are averaging more than 6000 hrs. in toughest service

If it means MORE PROFITS... BUDA'S GOT IT!

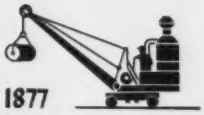
Any way you figure it... the great new line of Buda dyna-swirl Diesels gives you more for your power dollar—more positive advantages that add up to profitable operation.

Get the facts today. They speak for themselves. Ask your nearby Buda Engine Distributor. Write for Bulletin 1526 and complete details. *The Buda Company, Harvey, Illinois.*

BUDA *a Power-Full and Dependable Engine* ***FOR EVERY NEED***

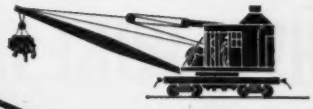


BROWNHOIST
finest, most modern CRANE . . . the result of 75 years of progressive engineering



1877

1927



Even in 1877 the first little coal-fired Brownhoist cranes were known as the best locomotive cranes of their day. Every year since, Brownhoist engineering has constantly improved the construction, design, and performance of their locomotive cranes of all types.

Today, Industrial Brownhoist Diesel Electric Locomotive-Cranes perform double duty as switch engine or crane. They work equally well with magnet, hook or bucket.

1952

Brownhoist's progressive engineering has developed the new Clear-Vision Boom and Monitor-Type Cab that assures unobstructed 360° visibility; Dynamatic Clutch with 32-step control that practically eliminates slippage and vibration; new type Hoist Clutches for high line pull and easy adjustment; worm driven Friction Clutch Boom Hoist for smooth, safe boom operation. Optional features on Brownhoist cranes today include Dual Controls, 8-Wheel Chain Drive for increased drawbar pull, Twin Engine Drive for greater traction and Timken Roller Bearing Journals. Brownhoist Diesel-Electric Locomotive Cranes are available in capacities from 30 to 80 tons.

BROWNHOIST builds better cranes

INDUSTRIAL BROWNHOIST CORPORATION • BAY CITY, MICHIGAN • DISTRICT OFFICES: New York, Philadelphia, Cleveland, San Francisco, Chicago, Canadian Brownhoist, Ltd., Montreal, Quebec • AGENCIES: Detroit, Birmingham, Houston, Los Angeles

184

A thousand and one wire ropes
PREformed and internally lubricated

The experience of hundreds of users—like yourself—goes into the making of Macwhyte Wire Rope. For more than half a century, their needs and yours have been studied by our engineers to produce the best wire rope for each job.

There are a thousand and one ropes to choose from. Recommendations are promptly available from Macwhyte distributors or Macwhyte Company.

Macwhyte Company, 2937 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

Catalogs are available on request

1017

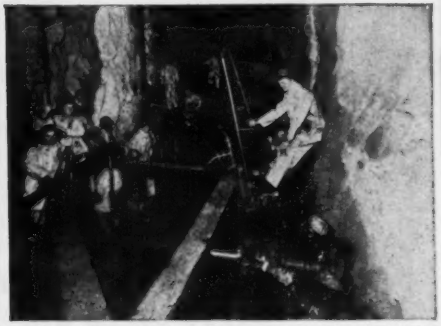
IN ORANGE FREE STATE

CP-55

DIAMOND DRILLS

SPEED GOLD PRODUCTION

CP-55 drilling in advance of development heading to test for high-pressure water pockets.



Six CP-55 Diamond Drills drilling grout holes ahead of shaft sinking to seal off high pressure water.

Usually the CP-55 Diamond Drill is thought of as the outstanding drill for exploratory and blast hole drilling. In gold mining in South Africa, however, this versatile diamond drill is also used for locating high-pressure water pockets and grouting, in advance of tunneling and shaft sinking.

With the most powerful rotary air motor on any diamond drill, the drilling speed of the CP-55 is exceptionally fast. It has a capacity of 500 feet with E Rods and EX Fittings. For holes deeper than 100 feet self-aligning rod pullers are available.

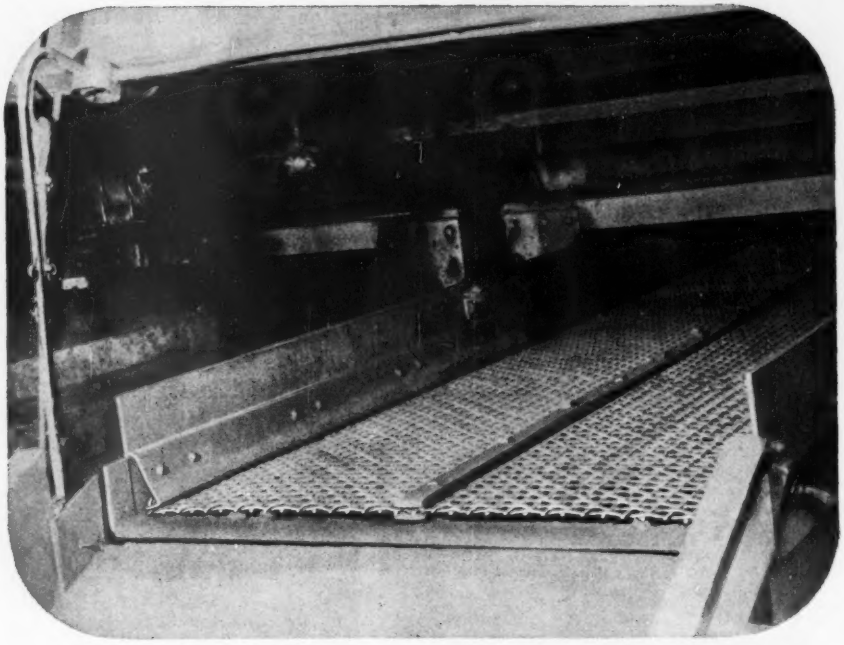
Hundreds of CP Diamond Drills are in use in South Africa — more than all other kinds of diamond drills combined — one mine alone having over a hundred CP Diamond Drills in service.

CHICAGO PNEUMATIC TOOL COMPANY

Write for Bulletin 518-2

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

AGGREGATE SCREENS



Our customers report that ROETEMP-ROEFLAT gives up to 315% more wire screen life

PROBABLY the first thing to say about Roebling Wire Screens made with ROETEMP wire... woven in the ROEFLAT construction... is that they stay on the job a whole lot longer. ROETEMP is an oil-tempered wire with high resistance to abrasion. ROEFLAT is the construction where the wires lie flat except at the short crimps... This harder, tougher wire, plus 75% more wearing surface, gives you far longer screen life... slashes your screening costs.

But ROETEMP-ROEFLAT has still more advantages. Its smooth, level surface causes less clogging and blinding than ordinary screens. Its precision openings provide more uniform grading and top screening efficiency.

ROETEMP-ROEFLAT can be made in almost any type of construction, such as ROETON and ROESLOT with openings of $\frac{1}{16}$ inch and up and square space with openings of $\frac{3}{8}$ inch and up... Before ordering screen again, find out what ROETEMP-ROEFLAT will bring you in new efficiency and savings. Woven Wire Fabrics Division, John A. Roebling's Sons Company, Roebling, New Jersey.

ROEBLING

WRITE TO
WOVEN WIRE FABRICS DIV.
JOHN A. ROEBLING'S SONS COMPANY
ROEBLING, NEW JERSEY

STANDARD ENGINEER'S REPORT

DATA

LUBRICANT Calol Vistac Oil

UNIT Rock drill-Ingersoll-Rand drifter

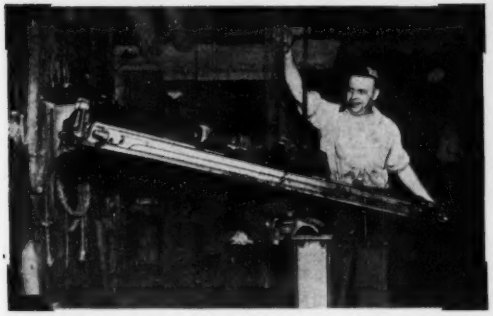
LUBRICATOR Line oiler

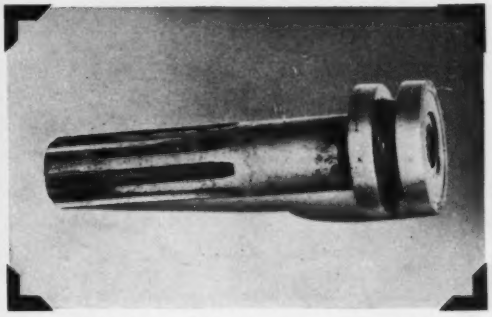
OPERATION Deep underground mining

CONDITIONS High humidity & temp.

FIRM Sunshine Mining Co., Kellogg, Idaho

Only 0.001 wear on rock-drill piston in 120 shifts!





ON THE 3100-FOOT LEVEL of the famous Sunshine silver mine, this drifter, lubricated with Calol Vistac Oil, was in steady service for more than two months before coming in for service. When disassembled by "Drill Doctor" Dave Farnsworth, the piston "miked" only 0.001 inch wear despite the tough conditions in which the drill works. Working face is 400 feet below sea-level. Humidity is around 90 with atmosphere at a constant 75°F. After cleaning, the piston and other parts were put back in service.

VALVE-CHEST ASSEMBLY, chuck and chuck jaw from the drifter. Note the absence of lacquer or corrosion on air-valve parts. Because Calol Vistac Oil has held air-tool wear to the minimum and is approved by the miners, Sunshine Mining Co. has used it for more than 10 years.

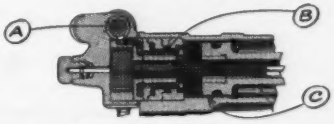
REMARKS: Besides providing good air-tool lubrication without excessive vapor or bad odor, Calol Vistac Oil is excellent for heavy-duty plain bearings, reduction gears, motor gear heads, etc. It comes in several grades and may be applied by wick-, ring-, and drip-feed oilers.

FREE CATALOG: "How to Save Money on Equipment Operation," a new booklet full of valuable information, will be sent you on request to Standard Oil Company of California, 225 Bush St., San Francisco, Calif.

CALOL

TRADEMARK "CALOL" REG. U.S. PAT. OFF.

How CALOL Vistac Oil cuts costs in air-tool equipment



A. Atomizes quickly and completely—carries evenly over all parts. Does not fog excessively and has no unpleasant odor.

B. Additives help form tenacious, oily, pressure-resistant film in wet or dry conditions—cuts wear and power loss. Small quantity lubricates efficiently.

C. Resists high temperatures and oxidation. Stays fluid at low temperatures.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your nearest distributor handling them, write or call any of the companies listed below.

STANDARD OIL COMPANY OF CALIFORNIA
225 Bush Street • San Francisco 20, California

THE CALIFORNIA COMPANY
P. O. Box 780 • Denver 1, Colorado

STANDARD OIL COMPANY OF TEXAS
P. O. Box 862 • El Paso, Texas

every other MARION 151-M on the IRON RANGE is a REPEAT ORDER

A NOTABLE RECORD OF ACCEPTANCE

Many of the biggest companies on the Iron Range are owners of MARION 151-M shovels.

MORE THAN HALF of these MARION owners have two or more 151-M machines.

In these days of urgent demand for increased ore production —days of high operating costs—days in which it is perhaps more important than ever to make wise selections of equipment, MARION is humbly proud of this unusual record of acceptance.

Let your nearest MARION representative show you the facts and figures about the jobs the MARION 151-M is doing on the range.

MARION POWER SHOVEL CO.
MARION, OHIO, U. S. A.

OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

from 3/4 cu. yd. to 45 cu. yds.

DU PONT ANNOUNCES

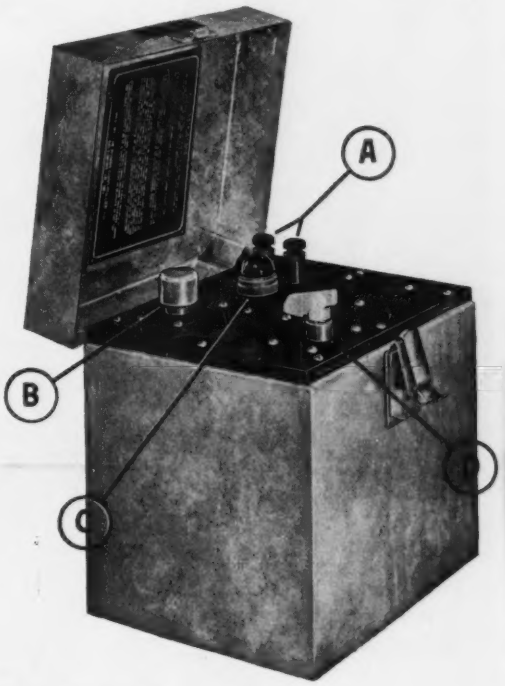
an entirely new ty

blasting machine

GREATER CAPACITY

GREATER DEPENDABILITY

GREATER SAFETY



This latest product of Du Pont Explosives Research is a newly designed, portable, condenser discharge type blasting machine. In two models: CD-45 and CD-30.

Both machines have exceptionally high capacity. The larger (CD-45) is the most powerful built to date. Both machines easily fire small tunnel rounds in straight parallel . . . sizable rounds in straight series . . . and a surprisingly large number of caps in parallel series.

These new machines have been thoroughly tested in various kinds of operations throughout the country and have been found suitable for every conceivable type of blasting job, either on the surface or underground. The number of caps fired is not dependent on the physical effort applied by the operator, and the machines contain no moving parts.

Several built-in safety features provide maximum protection at all times. A group of long-lasting, radio-type B batteries are used to charge a number of condensers. At the moment of firing, these condensers deliver a powerful, instantaneous surge of power to the blasting circuit. The terminals are dead at all times except at the instant of firing and can never be made alive unless the operator has both hands on the controls and really means to fire the shot.

THEY'RE SIMPLE TO USE:

1. Connect wires to terminal posts "A" shown in photo above.
2. Depress charging switch "B" and hold until neon pilot light "C" shines brightly.
3. Still holding charging switch down . . . move firing switch "D" to "on" position. This action fires the charge. *Terminals are energized only at the moment of firing* . . . absolutely removing risk of a premature blast. It's as simple as that!

SPECIFICATIONS

The new Du Pont blasting machine is available in two compact models encased in rugged, waterproof, electroplated metal boxes:

MODELS	CAPACITY straight series			
	primary blast	secondary blast	straight parallel	parallel series
CD-30 (small) wt. 24½ lbs. length 9½ inches width 9½ inches height 10½ inches	50	125	25	480 (12 series of 40 each)
CD-45 (large) wt. 31 lbs. length 11 inches width 9½ inches height 11½ inches	50	200	50	1200 (30 series of 40 each)

ASK THE Du Pont Explosives representative in your area for complete information about this new, safer, more dependable, high-capacity blasting machine. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

REG. U.S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

COLLYER CABLES **CUT** MINING **COSTS**

Collyer
Twin Parallel
Type G
Mining Cable

For samples of Collyer Mining Cables and recommendations, write Collyer Insulated Wire Company, 245 Roosevelt Ave., Pawtucket, Rhode Island.

CHOOSE *Collyer*

SAVE MANPOWER WITH

Ledeen

CYLINDERS

Wherever you have to—

PUSH or **PULL**

LIFT or **LOWER**

PRESS or **SQUEEZE**

TILT or **TURN**

OPEN or **CLOSE**

Ledeen cylinders provide positive, dependable power and pressure in straight line motion. Designed for air, oil, or water operation, they are uniform in design and construction, affording a wide number of varieties and adaptations. Ledeen cylinders are easy to install, occupy minimum space, and are built for long, economical service.

Standard Ledeen cylinders and mountings are available from distributors' stocks in major cities. Special cylinders if required. J.I.C., of course.

Ledeen Cylinders are GOOD Cylinders

Write for Bulletin 500

Ledeen Mfg. Co.
1606 San Pedro
Los Angeles 15, Cal.

5 reasons why modern mines buy Willison Automatic Couplers

1 SAFE

Willison Automatic Couplers require no manual assistance . . . no need for men to go in between cars to couple or uncouple a Willison Automatic!

2 FAST

All Willison couplers have the same contour . . . can be coupled at either end of car or locomotive . . . no time-consuming reversing is necessary.

3 STABLE

Close coupling of Willison couplers eliminates damaging slack . . . permits higher speeds with maximum stability . . . reduces surging and spilling.

4 PROTECTIVE

Two parts, the head and the lock, do all the work on every Willison coupler . . . take the shocks and strains to protect cars and locomotives from damage.

5 PROVED

Over 50,000 Willisons speed handling and cut costs in mines and industrial plants everywhere. Why not specify Willison Automatic Couplers for your haulage needs?

WRITE TODAY for circulars No. 1746 and No. 5240 for more information on Willison Automatic Couplers. National Malleable and Steel Castings Company, Cleveland 6, Ohio.

A-5845

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY

Est. 1868

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

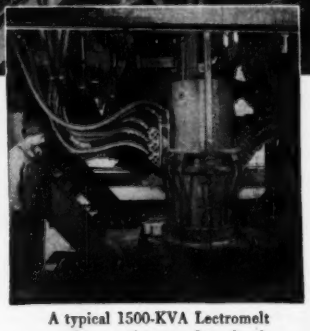
WILLISON AUTOMATIC COUPLERS • NACO STEEL WHEELS • NACO STEEL LINKS and SWIVEL HITCHINGS

This Continuous Process demanded CERTAIN PERFORMANCE

Two size "M" Lectromelt Furnaces melt cathodes to keep this copper refinery in continuous operation. A third, not shown, melts anode scrap.

So for the melting part of this electrolytic copper refinery operation, the logical choice was Lectromelt*. Because from the electrical brain that guides its operation to the massive shell of the furnace itself, Lectromelt is built to be a production tool. It will give you long, trouble-free service and correspondingly low-cost operation (we sell mighty few replacement parts).

For smelting or melting, refining or reducing—Lectromelt engineers will help you design your process and tailor-make the installation to your needs. Write for your copy of "Moore Rapid Lectromelt Furnaces for Smelting and Refining Operations," Pittsburgh Lectromelt Corporation, 322 32nd Street, Pittsburgh 30, Pa.



A typical 1500-KVA Lectromelt smelter at charging floor level. Three electrodes in line.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT... *Lectromelt*

Save Miles of Tunneling . . .

Save with One Track Tunneling with Speedy "Canton Car Transfer"

"Canton Car Transfer"

No need to dig and take out twice the width of a tunnel when a single track will do the job more economically . . . loads entire train on the single track. This famous economy device can be installed on any track of gauge and rail now in use. Its operation is simplicity itself . . . pushing empty car on track by locomotive, then moved by hand to transfer section, permitting locomotive and cars to pass. Train is pulled out all at one time. Two men in two minutes can take down, to move the three units to new location when desired . . . no alterations required for track or rails.

Timken Roller Bearings enable easy shunting of heavy cars to maximum weight of six tons. The Car Transfer speeds up loading, hauling, saves expensive double-tracking. Write for complete literature; please use street and zone numbers.

American Mine Door Co.

2039 Dueber Avenue
Canton 6, Ohio

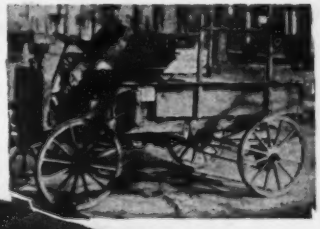
Manufacturers of "Dustributors" • Automatic Switch Throwers • Automatic Mine Doors • Mechanical Track Cleaners

PIONEERS IN TRUCK ENGINEERING

ANOTHER FIRST WITH DART

SINCE 1910

TALK WITH DART ABOUT YOUR TRUCK PROBLEMS YOU'LL GET SPECIALIZED SERVICE



The strongest truck frame built today is yours when you buy a Dart Truck with a "Box Girder" frame. Side rails are welded box sections with extra heavy top and bottom plates. Greater torsional strength and load carrying ability means protection of all mechanical components because of permanent alignment regardless of road irregularities. No loss of time due to frame repairs.

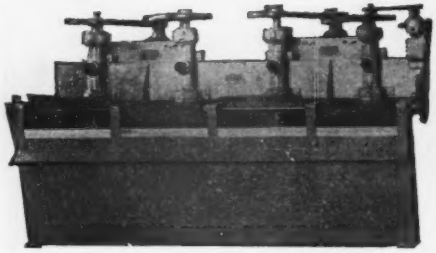
DART TRUCKS

TONNAGE ENGINEERED

DART TRUCK CO. KANSAS CITY 8, MISSOURI

OVER 40 YEARS EXPERIENCE IN BUILDING SPECIALLY ENGINEERED TRUCKS

OUTSTANDING PERFORMANCE WITH THE NEW BOOTH FLOTATION MACHINE!



- AS MUCH AS DOUBLE FLOTATION CAPACITY!
- CLOSE CONTROL
- UNIFORM AERATION
- EASIER TO WORK ON ROUGH JOBS
- TROUBLE FREE, SMOOTH OPERATION
- PRECISION BUILT

— NOW READY FOR DELIVERY — WRITE FOR COMPLETE DETAILS

MINERALS SEPARATION • SERVICE • EQUIPMENT

BOOTH ENGINEERS

146 SO. WEST TEMPLE • Salt Lake City 1, Utah

FLEXCO® BELT FASTENERS and RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute strain uniformly.
★ Made of Steel, "Monel," "Everdur." Also "Promal" top plates.

Compression Grip distributes strain over whole plate area

★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO.

4635 Lexington St., Chicago 44, Ill.

at your BUSINESS service:

The Classified Advertising Sections (Searchlight Sections) of McGraw-Hill publications are at your service for the satisfying of almost every business need or want.

Because these publications are specialized in the field that they cover, your classified advertising of used or surplus new equipment, of securing a position or personnel, of offering or securing business opportunities will reach the right men, quickly and economically.

Classified Advertising Division

McGRAW-HILL PUBLICATIONS

330 West 42nd St. New York 36, N. Y.

IF YOU WERE LIMITED TO ONE ENGINEERING BOOK

the 5th Edition of MARKS' would give you the greatest value and satisfaction as that book.

Complicated problems disappear as easily as routine questions of design and practice when you consult this new outstanding engineers' guide. Check your methods against today's best accepted practice, as reflected in the 16 *completely revised and modernized* sections of Marks' Handbook. It covers every branch of mechanical engineering, from aeronautics to mechanical refrigeration, from power generation to welding, from metal-cutting machines to hoisting and conveying — *providing answers to thousands of questions of every type.*

Completely Revised 5th Edition

MARKS'

MECHANICAL ENGINEERS' HANDBOOK

Edited by

LIONEL S. MARKS

Gordon McKay Prof. of Mech. Engr., Emeritus, Harvard University

5th Edition, 2236 pages, 6 x 9, approximately 2000 illustrations, $15.00

- New 6 x 9 page size (formerly 4½ x 7) permits an increase of about 10% in the text without increasing the number of pages, and a larger type size to assure you of good legibility. The book's illustrations and graphs have been similarly enlarged.
- The index, more detailed than ever before, contains over 12,000 entries in this edition, and again is one of the fullest and most useful to be found in technical books.
- Over 100 contributors, each a specialist in his field, bring you up to date with recent advances made in mechanical engineering *theory, processes, materials,* and *power.*
- 2236 pages of descriptions, data, and diagrams help you solve today's problems of design and practice.

10 DAYS' TRIAL—EASY TERMS

McGRAW-HILL BOOK CO., Inc.,
330 W. 42nd St., NYC 36

Send me Marks' MECHANICAL ENGINEERS' HANDBOOK, 5th Edition, for 10 days' examination on approval. In 10 days I will remit $3.00, plus few cents for delivery, and $3.00 monthly until $15 is paid, or return book postpaid.

Name .....

Address .....

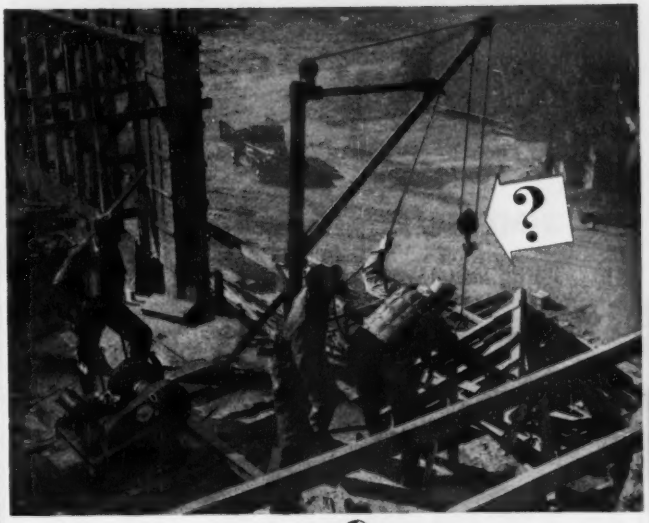
City .....Zone....State .....

Company .....

Position J-3-52

This offer applies to U.S. only.

What's the capacity of this block?



If you don't know.. don't use it!

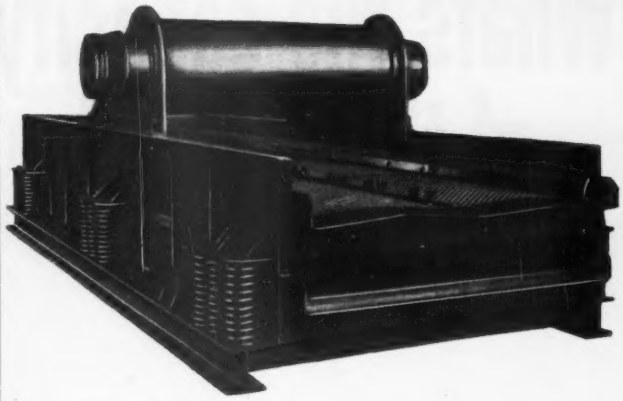
Did you realize that today . . . on your own jobs . . . the men *may not know* whether they're using a 2-ton wire rope block to lift a 4-ton load? That perhaps *nobody knows* when a hook might bend, or a pin might shear, and send the load crashing down? To avoid this reckless carelessness, give the order NOW to switch to American CROSBY Wire Rope Blocks. *They have their safe, predetermined capacity* EMBOSSED IN THE SIDE PLATE *for foolproof, lifetime protection.* Built with super-strength throughout . . . extra-thick side plates, oversize pins and axles, heavy stiffening straps, and rugged *drop-forged* hooks. Buy American CROSBY Wire Rope Blocks from your distributor or supply house, in sealed cartons. Made by the makers of genuine Crosby Clips . . . AMERICAN HOIST & DERRICK CO., ST. PAUL 1, MINN.

2301
65

American CROSBY

Load-Rated!

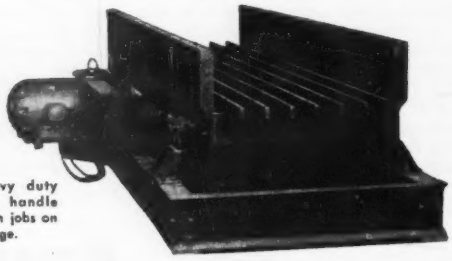
WIRE ROPE BLOCKS



SIMPLICITY gyrating screens are doing a fast, efficient sizing and dewatering job for the metal mining industry

The 6' x 20' Simplicity Model OM Double Deck Screen shown here is typical of Simplicity Screens used successfully at the great Mesabi Range in Minnesota to size and dewater iron ore. This screen, with a ⅜" opening on the top deck and a 1½mm. dewatering surface on the lower deck, is designed for heavy media concentration of iron ore.

Throughout the metal mining industry, Simplicity equipment is handling all types of preparation work from coarse scalping to fine screening and dewatering. Simplicity operating mechanism insures fast, accurate sizing and keeps production costs down.



Simplicity heavy duty scalpers also handle tough production jobs on the Mesabi Range.

Simplicity
TRADE MARK REGISTERED

ENGINEERING CO. • DURAND, MICHIGAN

Sales representatives in all parts of the U.S.A.
FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario
FOR EXPORT: Brown and Sites, 50 Church Street, New York 7, N. Y.

113

cost cutting way to long hole drilling

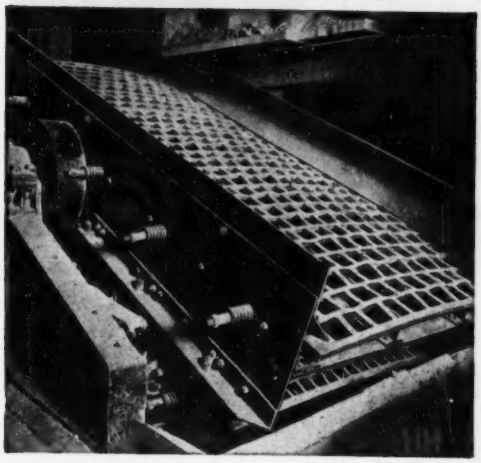
THE FIELD-PROVEN **ROK-BIT** WAY

No heavy capital investment. Complete, revolutionary facts in Bulletin EMJ-252. Rock Bit Sales & Service Co., 2415 E. Cumberland St., Philadelphia 25, Pa. • 350 Depot St., Asheville, N. C.

ROCKBIT
SALES AND SERVICE CO.

CARBIDE ROK-BITS • INTRA-SET DRILL STEEL • LONG HOLE DRILLING TOOLS • HOLE-SAVER • ALL TYPES OF HOLLOW DRILL STEEL

Outstanding Advantages of Hendrick Perforated Plate



for vibrating and shaking screens

- It maintains uniformity of mesh throughout an unusually long service life.
- It can be supplied with any desired shape and size of perforations.
- It can be made — either flat or corrugated — in any required gauge in tank, high carbon, high tensile, and abrasive-resisting steels.
- For screening highly abrasive materials, it is heat-treated to increase its toughness.
- Its full clearance practically obviates clogging.
- The ease with which decks can be changed cuts labor costs.

Write for copy of Hendrick Perforated Plate Catalogue.

SEE OUR CATALOG IN SWEET'S

HENDRICK
Manufacturing Company

Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Mitco Open Steel Flooring,
Shur-Site Treads, Armorgrids

70 DUNDAFF STREET, CARBONDALE, PENNA.
Sales Offices In Principal Cities

CORE DRILLING
—anywhere!

"We look into the earth"

- Mineral Prospecting
- Foundation Test Borings and Grouting
- Large diameter holes for Ventilation and Emergencyways

PENNSYLVANIA Drilling CO.
DRILLING CONTRACTORS & MFRS.
1205 Chartiers Ave. PITTSBURGH, PA. WAlnut 1-5816

CONCRETE LINING

Complete Equipment for Concrete Lining of Tunnels, Entries and Haulageways.

Write for Bulletin #15.

PNEUMATIC GROUTERS—Bulletin #13.

MAYO TUNNEL & MINE EQUIPMENT
LANCASTER, PA.

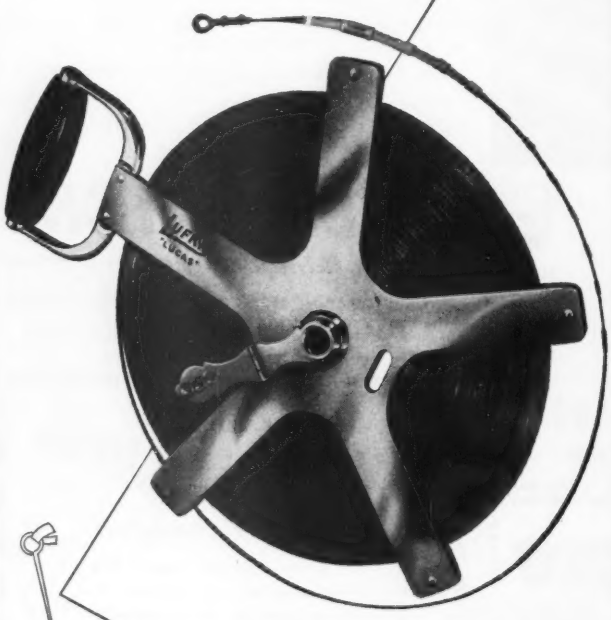
Users praise ANTON SMIT BITS in these volunteered reports:

- They have *out-performed* the — —and — —bits.
- The heads of Anton Smit bits do not come off!
- An improvement over the other impregnated bit we tried.
- . . . the Best bits used thus far on our drilling at — —
- Cut the *highest footage* obtained by any bit on this job!
- Our records indicate a pretty good margin in favor of your bits.
- The first Ascolite bit you sent me worked fine . . . please send me six more . . .
- . . . greatly pleased . . . find them more serviceable than other pre-set bits tried.
- . . . drilled over 500 feet in ground where the average for hand-set bits is 110 feet . . .
- The bits were . . . unusually satisfactory and it is desired to obtain four new bits like them.
- . . . shows a considerable saving . . . over our own cast-set bit . . . we wish to have four more made up.
- *The letters containing the above comments are on file in our New York Office.*

Est. 1908 **ANTON Smit & CO., Inc.**

Importers and Dealers • Carbons, Bortz, Ballas
Manufacturers of Diamond Tools
333 W. 52nd St., New York 19, N. Y. Cables: PROFITABLE, New York

LUFKIN "LUCAS" MINE TAPES



An extra tough, tinned steel tape line ⅛" wide, designed especially for mine work. Clear, sharp graduations and figures deeply stamped into nickel silver sleeves —securely soldered to steel line. Strong metal reel, nickel plated. Long folding winding handle, ample size hardwood carrying handle. Reels of tapes up to and including 150 feet are 4-arm pattern; over 150 feet, 5-arm as illustrated. Leather thongs supplied. Available in all desired markings.

BUY LUFKIN

TAPES • RULES • PRECISION TOOLS • FROM YOUR SUPPLY HOUSE

The Lufkin Rule Co., Saginaw, Michigan

132-138 Lafayette St., New York City • Barrie, Ontario

171

for purer clays try this...

PQ

Depending on the clay, .05% to 0.2% N® or S® 35 Silicate added to a water slurry deflocculates the clay. When passed through baffled pans, heavy impurities (sand, mica) drop out from the suspended clay particles. After neutralization with acid, pure clay settles out of the solution.

PQ Silicates' economy is useful also in refining phosphate, graphite, fluorspar. Write...

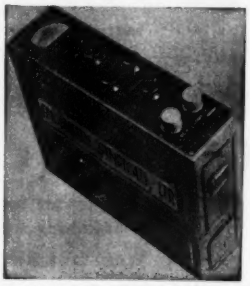
Philadelphia Quartz Company
1135 Public Ledger Bldg.
Philadelphia 6, Pa.

PQ SOLUBLE SILICATES

CAN YOU AFFORD TO BE WITHOUT THE

Scintillometer

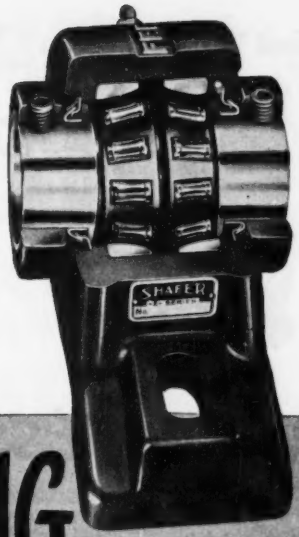
LOCATE URANIUM 100 TIMES EASIER. THE ONLY PORTABLE GAMMA RAY DETECTOR EMPLOYING CRYSTAL SCINTILLATION. DETECTS ALMOST 100% OF GAMMA RAYS IN COMPARISON TO LESS THAN 1% DETECTED BY THE GEIGER COUNTER.



ALL TYPES GEIGER COUNTERS; SPECIAL LONG PROBE COUNTERS FOR TESTING DRILL HOLES; ULTRA VIOLET LIGHTS

Engineers Syndicate, Inc.

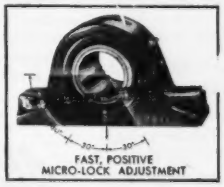
The House of Geiger Counters
5011 Hollywood Blvd.
Hollywood 27, California



BIG LOAD CAPACITY PACKED IN SMALL SPACE

Shafer ConCaVex Bearings have the design and construction features that keep them free-rolling, self-aligning and self-centering under *all* operating conditions at *all* times—without additional weight or size, without shoulders, without auxiliary means of absorbing thrust.

With Shafers you get stamina and performance advantages exceeded by none: Capacity for radial, thrust or any combined radial-thrust loads • High shock load capacity with low friction • Integral self-alignment within the bearing itself • Exclusive Micro-Lock for quick, simple bearing adjustment • Exclusive, self-centering "Z" Type Housing Seal • Compact sturdiness combined with the original Shafer ConCaVex design which has answered industry's every dependability need for more than 32 years. Complete engineering service for the asking. SHAFER BEARING CORPORATION, 801 Burlington Ave., Downers Grove, Ill.



Ask for new Industrial Bearing Catalog No. 51.

SHAFER CONCAVEX

Pillow Blocks • Flange Units • Cartridge Units • Flange Cartridge Units • Duplex Units • Take-Up Units • Take-Up and Frame Units • Unmounted Bearings • Aircraft Control Bearings.

Double-acting power ... 70° angle
—for fast, clean dumps of loads up to 50 tons

Exclusive cross-channel body design
—to stand up under impact loads of rock and ore

You get both—with

HEIL TELESCOPIC HOISTS

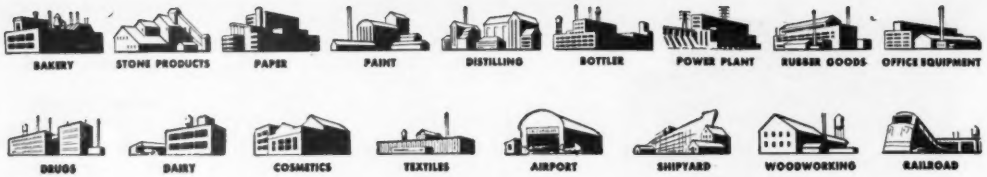
and Rock Bodies

HOIST has built-in snubber to prevent "kickback" or overdumping with sticky load. Universal-joint mounting prevents binding when truck frame twists or flexes. Mounting height as low as 11". Valve handles top pump output with almost no pressure loss. . . . Body has wearplate of ½" high tensile steel, to resist abrasion and local deformation. Cross-channel design prevents body-sag—adapts to exhaust gas-heated floor. . . . These and other Heil advantages mean dependable, trouble-free performance. Have your nearby Heil distributor show you. Or write us for further information.

BH-177

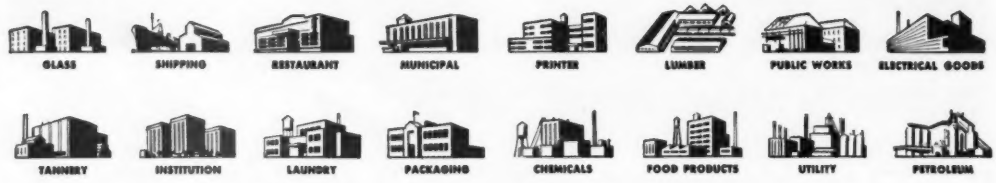
THE HEIL CO.

Factories: Milwaukee, Wis. — Hillside, N. J.
District Offices: Hillside, N. J., Washington, D. C., Atlanta, Milwaukee, Detroit, Chicago, Kansas City, Dallas, Los Angeles, Seattle



TODAY...

We're all in the steel business!



FOR EACH OF US TO *GET* MORE STEEL . . . AND PRODUCTS MADE OF STEEL . . .
WE'VE GOT TO *PROVIDE* MORE SCRAP TO *MAKE* THE STEEL.

Half the melting stock used in the steel mill or iron foundry consists of iron and steel scrap. In normal times, enough scrap is produced by the mills, foundries, railroads, fabricators and scrap dealers to fill the need.

But now the mills have stepped up capacity to meet the greatly increased military and civilian demands for steel. And that increased capacity has outstepped the supply of scrap.

That is why we are calling on plants in both metal-working and NON-METAL-WORKING industries to provide the needed scrap NOW.

You have the heavy scrap needed to make more steel

Enough obsolete machinery, equipment and parts are being carried as useless inventory to give a big push to the production of steel. Surveys have proved this.

The trick is to get that old steel into the hands of the steel producers.

We're putting that job up to you.

To help maintain steel production... provide more steel for the equipment you want . . . turn in your idle iron and steel to your local scrap dealer.

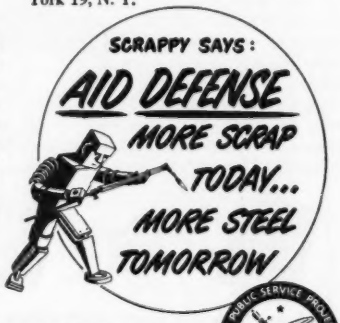
What you can do to help maintain steel production

1. Appoint one top official in your plant to take full responsibility for surveying the plant and getting out the scrap.

2. Consult with your local Scrap Mobilization Committee about its program to help out in the scrap crisis. For chairman's name, check with your Chamber of Commerce, or the nearest office of the National Production Authority, Department of Commerce.

3. Call in your local scrap dealer to help you work out a practical scrapping program. Non-ferrous scrap is needed, too.

4. Write for free booklet, "Top Management: Your Program For Emergency Scrap Recovery", addressing Advertising Council, 25 W. 45 St., New York 19, N. Y.



This advertisement is a contribution, in the national interest, by

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET, NEW YORK 18, N. Y.

PUBLIC SERVICE PROJECT THE ADVERTISING COUNCIL

AMAZING ABRASION RESISTING MATERIAL

It's called CAST BASALT and it's been used for many years — particularly in Europe.

What is Cast Basalt?

A product of selected natural volcanic rock, furnace-melted and specially finished to give exceptional resistance to abrasion and corrosion.

How tough?

Compressive strength over 70,000 lbs. per sq. inch hardness on Mohs Scale of 8-9 compared to the diamond's 10. Lasts 10-20 times longer than 1" cast iron liners.

Applications?

Because CAST BASALT is supplied in standard shapes, flat and curved or made to special requirements, it is used for all types of linings (and extra-heavy-duty floors) where abrasion wears out other materials.

Get to know more about

CAST BASALT

Write to us today and we will send you full details

H. WINDSOR & CO. LTD.

748 FULHAM ROAD, LONDON, S.W.6.

ENGLAND. *Cables: Boilasetta, Walgreen, London.*

Type "AW" automatic priming pump handling naphtha.

Split Bearing Stand Cuts Maintenance Cost of NAGLE PUMPS

Just unscrew (or cut off with a torch if necessary) four nuts on each side and the top half of the bearing stand lifts off exposing the bearings. Merely loosen one nut on each side to release tubular supports, for slippage seal adjustment. Instant "thumb & forefinger" packing gland adjustment. Impellers, plates or casings changed in a jiffy. These and other features cut maintenance costs to the bone. That is why Nagle Pumps are preferred for the really tough pumping jobs. Also vertical shaft pumps for pumping abrasive or corrosive materials.

Nagle Pumps, Inc.

INDUSTRIAL PUMPS FOR ABUSIVE APPLICATION

1239 Center Ave. Chicago Heights, Ill.

Professional Services

ASSAYING
CONSULTING
PROSPECTING
ORE TESTING

RESEARCH
METALLURGY
MILL DESIGN
MINE MANAGEMENT

AGENCE MINIERE & MARITIME S.A.
Sworn weighers, samplers & Assayers of Ores, Metals. Representatives of shippers at European ports & Works. *Market surveyors and commercial advisers assuring sales direct to consumers*
2, rue Van Bree, Antwerp (Belgium)

HERON ENGINEERING CO.
Surveys, Reports, Designs and Estimates for Mine, Metallurgical and Industrial Installations. Including Power Plants, Railroads, Tramways, Water Supply and Waste Disposal Systems.
2000 South Acoma, Denver 10, Colorado
Chama, New Mexico

ARTHUR NOTMAN
Consulting Mining Engineer
40 Wall St., 19th Floor
New York, N. Y., U.S.A.
Telephone WHitehall 4-42998

VAIL ENGINEERING CO.
Consulting Mining Engineers
Box 59, Platteville, Wis.

BEHRE DOLBEAR & COMPANY
Consulting Mining Engineers and Geologists
11 Broadway, New York 4, N. Y.

KELLOGG KREBS
Metallurgical Engineer
Mineral Dressing Consultant
564 Market St. Telephone:
San Francisco 4, Calif. SUtter 1-6613

RODGERS PEALE
Consulting Mining Geologist
315 Montgomery Street
San Francisco 4, Calif.

WALKER & WHITE, Inc.
Umpire, Assayers, Chemists
Shippers Representatives
409 Pearl St. New York City

BLANDFORD C. BURGESS
Consulting Engineer
Industrial Mineral Specialist
Appraisals Mineral Surveys
Plant Design
Prospecting Development—Efficiency
Ground Water Studies
Box 250 Monticello, Ga.

LEDOUX & COMPANY, Inc.
Metallurgical Chemists — Assayers
Spectroscopists
Samplers - Weighers
Representatives of Shippers of Ores and Metals at Buyers Works
Office and Laboratories
155 Sixth Ave., New York 13, N. Y.

ROGER V. PIERCE
Mining Engineer Specialist
Underground Mining Methods, Cost Cutting Surveys—Production Analysis
Mine Mechanization—Mine Management.
1506 Wasatch Dr., Salt Lake City Utah

WEISS GEOPHYSICAL CORP.
Mining geophysical surveys with aerial and ground magnetic, gravimetric, seismic, and electrical methods. Experienced crews for systematic work in any part of the world.
149 Broadway Rector 2-6294
New York 6, N.Y. Cable: "Geophysics"

GLENVILLE A. COLLINS
Mining Engineer
Specializing in Uranium Examinations
210 La. Arcada Bldg.
Santa Barbara, Calif.
513 Royal Bank Bldg.
Vancouver, B. C., Canada

ROBERT B. McELWAINE
Consulting Mining Geologist
P. O. Box 127
Little Rock, Arkansas

LUCIUS PITKIN, INC.
Mineralogists—Assayers
Chemists—Spectroscopists
SHIPPERS REPRESENTATIVES
Main Office—Laboratories
Pitkin Bldg.—17 Fulton St.
New York 7, N. Y.

HARRY J. WOLF
Mining and Consulting Engineer
Examinations — Valuations — Management
420 Madison Avenue
New York 17, N. Y.
Cable: MINEWOLF
Tel.: Plaza 9-1700

ABBOT A. HANKS, INC.
ASSAYERS—CHEMISTS
Est. 1868
Spectrographic Analysis
Shippers Representative
624 Sacramento Street
San Francisco 11

ARNOLD H. MILLER
Consulting Engineer
General Mine, Mill and Industrial Appraisals
Plant Design, Mechanization and Improvement
Cable: "ALMIL." Tel. Cortland 7-0635
120 Broadway, New York 5

SMITH-EMERY CO.
Assayers and Chemists
SPECTROGRAPHIC ANALYSES
920 Santee Street
Los Angeles 15, Calif.

J. W. WOOMER & ASSOCIATES
Consulting Mining Engineers
Modern Mining Systems and Designs
Foreign and Domestic Mining Reports
National Bank Bldg., Wheeling, W.Va.
Union Trust Bldg., Pittsburgh, Pa.

E. LEE HEIDENREICH, JR.
Consulting Engineers
Crushing Plants Quarries
Milling Plants Plant Design
Plant layouts Appraisals
75 Second St., Newburgh, N. Y.
9 So. Clinton St., Chicago 6, Ill.

NEW WORLD EXPLORATION RESEARCH & DEVELOPMENT CORP.
Contract Mineral Surveys
Foreign & Domestic
Geological Geochemical
Geophysical Diamond Drill
Integrated Exploration
Box 1206 Reno, Nevada

MARVIN J. UDY
Inorganic Chemistry Electrochemistry
Electric Furnace Smelting
Process Metallurgy
Ferro-Alloys, Calcium Carbide, Phosphorus
Telephone 2-6294
546 Portage Rd. Niagara Falls, N. Y.

ECONOMY—*Today and Always*
The service of the Consultant is a real economy—with his knowledge of the mining industry and his wide and varied experience, he can usually be of great assistance in coping with your most intricate problems.

PROFITABLE MINE OPERATION

calls for operating efficiency all along the line. These specialists in various phases of mine operation can aid you materially in determining quick, economical solutions to your mining problems that make for more efficient operations, resulting in lower costs and a consequent greater return on your investment. Consult them!

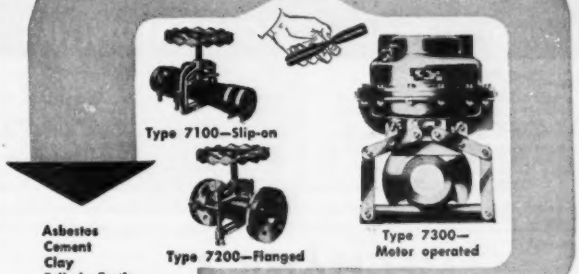
on the world's
BIGGEST
wire rope jobs...

experienced riggers demand
GENUINE
CROSBY CLIPS

Drop-forged, hot-dip galvanized wire rope fasteners
•
SIZES FOR ALL WIRE ROPE
•
DISTRIBUTORS EVERYWHERE

AMERICAN HOIST & DERRICK CO.
ST. PAUL 1, MINNESOTA

If it Flows...



Asbestos
Cement
Clay
Fuller's Earth
Lime
Magnesia
Phosphate
Potash
Salt
Sand
Coal

Flex-Valve it

FLEX-VALVE is the ideal choice for handling such materials as those listed—either dry or in suspension—at temperatures up to 210 deg.

Resists both abrasion and corrosion; eliminates clogging, plugging, building up; absorbs vibration and misalignment.

Open—it's as free of obstruction as the pipe itself. Closed—it's bubble-tight and it closes tight on all of these materials.

Available in either hand or air operated types in sizes from ½ to 12 in.

Users have found FLEX-VALVE to be the low-cost solution to tough valving problems. If your present valves aren't 100% effective, take a look at this one. Catalog 455 gives details.

FLEX VALVE

Flexible Valve Corporation

7885

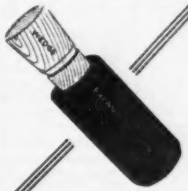
445 COMMERCIAL AVE. • PALISADES PARK, N. J.

PLACER GOLD

Most accurately and economically tested for . . . with the

EMPIRE DRILL

NEW YORK ENGINEERING COMPANY
75 West St., N. Y. City, U.S.A. Cable Address NYECO, N.Y.



QUICK-SEAL TAMPING PLUG

(Patented)

Seals the hole airtight!
Requires no additional stemming!
Better pull with less powder!

Misfire can be handled safely . . . No drilling of extra holes when a shot has misfired, thus removing all danger of drilling into a shot . . . Saves time of preparing stemming . . . Breaks more ground with a minimum of explosives! For full details write today!

QUICK-SEAL PRODUCTS, INC.
Herndon, Pa.

PLACER MINING
BUCKET LINE DREDGES
TIN–PLATINUM–GOLD

Screen Plates
Pumps

YUBA DREDGES

Bucket Pins
Jigs

YUBA MANUFACTURING CO.

Room #706, 351 California St., San Francisco 4, California, U. S. A.
AGENTS { BIRCH, CARRY & CO., LTD. • SINGAPORE, KUALA LUMPUR, PENANG.
SHAW CARRY & CO., LTD., 16 & 19 LEADENHALL ST., LONDON, E. C. 3.
CABLES: YUBAMAN, SAN FRANCISCO; SHAWCARBCO, LONDON

GEIGER COUNTERS, SCINTILLOMETERS
METAL DETECTORS, ULTRA-VIOLET MINERALIGHTS

—all from one source. The Radiac Company carries in stock ready for immediate shipment every better manufactured type of detection instrument for prospecting. Write for descriptive literature on our instruments for locating *uranium, strategic minerals and oil.*

The Radiac Company, Inc.
489 Fifth Avenue, New York, New York
Tel. MUrray Hill 7-7833

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE

$1.20 a line. Minimum 3 lines. To figure advance payment count 5 average words as a line. (See 1 on Box Numbers.)
POSITION WANTED and Individual Selling Opportunity undisplayed rate is one half of above rate, payable in advance.
PROPOSALS, $1.20 cents a line an insertion.

INFORMATION:

BOX NUMBERS count one additional line in undisplayed ads.
DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).
EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE

The advertising rate is $12.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.

NEW ADVERTISEMENTS Address N. Y. Office, 330 W. 42nd St., N. Y. 36, N. Y. For April Issue closing March 20th

MECHANICAL DESIGN ENGINEERS

Steady employment with expanding heavy machinery manufacturer with permanent industrial market. Must have experience in heavy machinery design and layout, and be interested in original development. Send complete data, including photo.

THE EIMCO CORPORATION
P. O. Box 300
Salt Lake City 10, Utah

SALES ENGINEER WANTED

OLD ESTABLISHED MANUFACTURER OF MINING AND CRUSHING EQUIPMENT HAS PERMANENT OPENING FOR EXPERIENCED SALES ENGINEER. STATE FULL DETAILS OF EXPERIENCE INCLUDING SALARY AND ENCLOSE PHOTOGRAPH. MEDIUM SIZE MIDWEST CITY WITH ADEQUATE HOUSING. EXTENSIVE TRAVELING. EXCELLENT OPPORTUNITY WITH PROGRESSIVE SMALLER MANUFACTURER. REPLY WILL BE HELD IN STRICT CONFIDENCE.

SW 3116, ENGINEERING AND MINING JOURNAL
520 N. Michigan Avenue
Chicago 11, Ill.

REPRESENTATIVES WANTED

Substantial English concern introducing revolutionary proven engineering product, invites correspondence with qualified engineers selling engineering equipment to Gas Works, Iron and Steel Works, Steam Power Stations, Mines, Quarries, etc., in the States of N. Y., Pa., Ohio, Ill., Mass., Conn. and N. J. view Representative.

RW 1906 Engineering & Mining Journal
330 W. 42 St., New York 18, N. Y.

WANTED

Large engineering firm wishes to acquire several complete plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment whole or in part. Personnel retained where possible, strictest confidence.
Box 1231, 1474 Broadway, New York 18, N.Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42 St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

SURFACE MINING CONTRACTS WANTED

Contractor desires contracts, on share or percentage proposals, for open pit mining and surface development including access roads in Western United States. Have modern machinery and experienced personnel.

J. HENRY HARRIS
2657—9th St., Berkeley 10, Calif.

POSITIONS WANTED

MINING ENGINEER: 43, chief engineer, field engineer, mine superintendent, mine manager—domestic and foreign. PW-3416, Engr. & Mining Jrl.

MINING ENGINEER, 43, evaluation, mine layout and organization for methods applicable to conditions; modern breaking, handling, back-filling, surveying, ventilation, mine safety. Domestic and foreign experience. PW-3420, Engr. & Mining Jrl.

OPEN PIT MINING

Contractor with excellent equipment and experienced personnel interested in excavating, material handling, or open pit mining work.

CW1319 — Engineering & Mining Journal
330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITIES

California—Values $175 Per Ton
Narrow persistent vein—Favorable report. Offer fifth interest for completion of drilling recommended by geologist. BO-3385, Engr. & Mining Jrl.

Sixteen Uranium Claims
In producing Uranium country Colorado. $32,000.00 cash, $2,500.00 per claim. BO-3444, Engr. & Mining Jrl.

GOLD PLACER OPPORTUNITY

HAVE LEASE rich placer 40 to 80 million yards gravel, no overburden. Had reputable M.E. explore property. Put down 100 pits, gold in 98, recommends churn drillings. Will give substantial interest for $15,000 to churn drill property. Have reason to believe gravel will run 87c to $2.00 per yard. Have large contracting company ready to operate property.

R. WILLIAMS
3821 Old Spanish Trail
Houston, Texas

ROCKS AND MINERALS

a magazine for collectors.

If you collect rocks, minerals, sands, pebbles, crystals, ores, gems, ROCKS AND MINERALS is your magazine. Founded in 1926, issued once every two months. 112 pages per issue, $3.00 a year (sample copy 60¢).

ROCKS and MINERALS
Dept. MJ, Box 29, Peekskill, N.Y.

IF

there is anything

you want . . .

that other readers of this paper can supply

or—

something

you don't want

that other readers can use, advertise it in the

SEARCHLIGHT SECTION

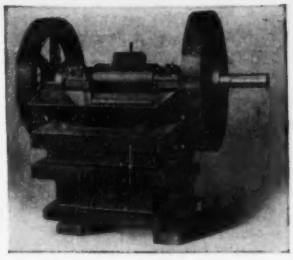
DEPENDABLE EQUIPMENT AT A SAVINGS IN TIME AND COST

COMPRESSORS

1—6" x 5" Worthington horizontal, 80 CFM.
1—6" x 6" Gardner vertical, 90 CFM.
1—8½" & 4¾" x 5" Chicago-Pneumatic, 131 CFM.
1—7" & 5¾" x 5" Gardner-Denver, 156 CFM.
1—12" x 10" Ingersoll-Rand, 179 CFM.
1—14" & 9" x 8" Bloisdell, 213 CFM.
1—12" & 6½" x 10" Ingersoll-Rand, 293 CFM.
1—14" & 7½" x 12" Ingersoll-Rand, 447 CFM.
1—14" & 8¾" x 10" Sullivan, 637 CFM.
1—16" x 12" Union, 698 CFM.
1—18" & 11" x 16" Ingersoll-Rand, 800 CFM.
1—13" x 10" Leidlaw, 840 CFM.
1—24" & 13" x 16" Ingersoll-Rand, 1418 CFM.
1—210 CFM Worthington "Blue Brute" portable compressor driven by Continental gas engine.
2—310 CFM Gardner-Denver portable compressors driven by Buda gas engines.
2—5½" & 5½" x 4½" Sullivan 144 CFM compressors driven by 25 HP motors, mounted on 36" ga. trucks.

LOCOMOTIVES

1—2½ ton Mancha battery locomotive "Titan A" 24" ga. with 2 sets Edison batteries and charging set.
1—2-2½ ton Whitcomb battery, 24" gauge
2—7 ton G.E. permissible type battery, 36 gauge
2— 8 ton G.E. battery, 36" gauge
4—10 ton Atlas battery, 36" gauge
1— 3 ton Whitcomb gas engine driven, 24" gauge
1— 3 ton Ruth gas engine driven, 18" gauge
1— 6 ton Goodman trolley, 36" gauge
2—8 ton Goodman battery, 36" ga.
2—5 ton Mancha battery, 36" ga.
1—5 ton Jeffrey battery, 36" ga.
2—8 ton Goodman trolley, 36" ga.
1—5 ton Goodman trolley, 36" ga.



JAW CRUSHERS

2—9" x 12" Universal 2M
1—9" x 12" Cedar Rapids
1—8" x 24" Rogers
1—8" x 36" Universal
1—9" x 36" Cedar Rapids
1—13" x 24" Telsmith
1—15" x 28" Pacific
1—8" x 8" Universal
1—9" x 15" Farrell

MISCELLANEOUS EQUIPMENT

1—Ingersoll-Rand wagon mounting drill type FM2 mounted on 2 rubber tired wheels.
1—27" x 14" MacFarlane crushing rolls.
1—54" x 26' rotary dryer.
1—150 HP Vulcan single drum-hoist complete with motor and controls.

SAND PUMPS

1—1" Wilfley sand pump
2—2" Wilfley sand pumps.
1—2" Denver vertical sand pump
3—2" Telluride sand pumps
1—2½" Traylor sand pump
1—3" Allen-Sherman-Hoff rubber lined hydro-seal
1—3" Wilfley sand pump
1—3" Telluride sand pump
1—4" Allen-Sherman-Hoff hydro-seal
1—4" Denver vertical sand pump
1—6" Wilfley sand pump

TUGGER HOISTS

1—Dillon-Box model 3 single drum air tugger.
1—Ingersoll-Rand model 6 HC single drum air tugger.
1—Ingersoll-Rand size 5NN-01-1 2 drum electric slusher hoist.
1—Sullivan class RH single drum electric tugger.
1—Ingersoll-Rand size 107 single drum electric tugger.
1—Sullivan model D211 2 drum electric slusher hoist.
2—Sullivan type HE D.C. single drum electric tuggers.
9—Sullivan type HDE D.C. double drum electric slusher hoists.
1—Sullivan model HDE 10B 2 drum tugger hoist direct driven by 4 cyl. Continental gas engine.

GRINDERS & SHARPENERS

1—Ingersoll-Rand new jackbit grinder size JA4 air driven.
1—Mossco type G rockbit grinder with 5 HP motor.
1—Ingersoll-Rand bit grinder J3 with 3 HP motor.
1—Ingersoll-Rand bit grinder model JO3 driven by Wisconsin gas engine.
1—Ingersoll-Rand #40 drill sharpener.
1—Ingersoll-Rand #5 drill sharpener.

BETTER MACHINERY — IT'S FULLY RECONDITIONED

ESTABLISHED 1898

MORSE BROS. MACHINERY CO.

P.O. BOX 1708 DENVER, COLORADO, U.S.A. CABLE "MORSE

COMPLETE ORE-MILLING PLANTS · CONCENTRATION · FLOTATION · MACHINERY · CYANIDE · AMALGAMATION

General Office and Plant: 2900 BRIGHTON BLVD., DENVER, COLO.

FOR SALE

10—250,000 C.F.M. Buffalo ventilating fans — type LLD, double width, size 15, class 1, clockwise rotation, top horizontal discharge, arrangement 3, with sleeve bearings. Excellent Condition.

Harvey Machine Co., Inc.
19200 So. Western Avenue
Torrance, California
Phone: NEvada 6-2111

AIR COMPRESSORS
9 Electric 5,000, 3,865, 3,178, 2,200, 1,578 & 1,302
1,000 67, & 500 Ft.
6 Diesel 1,578, 1,000, 670 & 500 Ft.
LOCOMOTIVES AND CRANES
12 Diesel 100, 90, 65, 45, 30, 20 Ton Locomotives.
22 Gas. 35, 25, 16, 12, 9 & 6 Ton Locomotives.
40 Ton Orton Diesel Locomotive Crane.
R. R. CARS
100 Dump Cars. 2, 4, 12, 20 and 30 Yd.
100—60 Ton Flat Cars. 66—50-Ton Gondolas.
150—8,000 & 10,000 Gal. Cap. Tank Cars.
TUNNEL MUCKERS — LOADERS
4 Gardner Denver GD9 & GD14.
10 Eimco 12B & 21, 4 Sullivan HL20.
LARGE JAW CRUSHERS
7—60x84", 40x48", 36x42", 24x36" & 20x30".
ROTARY DRYERS AND KILNS
48"x20', 48"x45', 54"x40', 60"x50', 70"x45', 80"x80', 84"x50'.
Single and Double Shell.
Kilns, 6'x80', 4'x45' & 8'x175'.
BALL, ROD & TUBE MILLS & CLASSIFIERS
2—5'x22' A.C. Tube Mills
8'x22", 6'x22", 6'x18", 5'x22" & 8'x30" Hardinge Conical Ball Mills.
4x4, 6x6 & 7x5 Cylindrical Ball Mills.
8', 10' & 16' Mechanical Air Separators.
36" & 70" Spiral and 4' Dorr Rake Classifier.
4x16, 5x12, 7x18 Rod Mills. Marcy, Hardinge.
Cottrell Precipitator 100,000 CFM.
Dings 3-stage 18" Wetherill Mag. Separator.
200 400 & 700 HP—Double Drum Mine Hoists.
75, 300, 450, 500 & 700 HP Single Drums.
STEEL STORAGE TANKS
40—10,000 Gal. R. R. Car Tanks.
PULVERIZERS
Hercules Jr. & #1 & 2 Ring Roll.
STANHOPE, 80 E. 42nd St., New York 17, N. Y.

CRUSHERS, JAW: Sizes 12" x 15" to 48" x 60".
CRUSHE REDUCTION TYPE: Symons 3 ft., 4 ft. and 5½ ft. with short heads and fine bowls, with motor and drives. 1—2 ft. coarse bowl.
DRYERS or KILNS: 1—10 ft. x 90 ft., heavy duty, with or without auxiliary equipment, condition like NEW. 1—Kiln 4 ft. dia. x 65 ft., complete with all equipment, oil fired, like NEW. Located Minnesota.
CLASSIFIERS: 1—Dorr 22' dia. bowl, 8' x 39 ft. rake, with motors and drives. New 1950. 4—Adkins 54" Simplex single pitch, Weir type, 220/440 volt motors, used four months.
APRON FEEDER: 1—48" x 18 ft. heavy duty, with motor and drive. New 1950.
PULVERIZERS: Marcy 8 ft. x 12 ft. Rod Mill, with motor and drive, new 1950, with 30 ton 4" x 12 ft. rods. Hardinge Mill 5' x 22", manganese lined for dry grinding, complete with motor and feeder.
MINE HOISTS: 150 H.P., 6'6" dia., 6'8" face; 250 H.P., 72" dia., 48" face; 200 H.P., double drums, one clutched, 8 ft. dia., 4 ft. face. All 3 phase, 60 cycle, 2200 volt with control equipment. Head Frame for double shaft 16'9" x 17'2", height 55 ft., with or without 8 ft. dia. sheaves for 1½" rope. One 950 H.P., double drums, 14' dia., 6'10" face, 1⅞" rope, 1500 FPM complete with 950 H.P. motor and controls. Other hoists 100 H.P. to 1050 H.P., single and double drum with electric equipment.
MOTORS: 2—NEW Pump Motors 1000 H.P., 1800 RPM, 2200 volt, drip proof, with automatic switch gear. NEW, UNUSED.
1—950 H.P. Hoist Motor, 2200 volt, 443 RPM, with controls.
COMPRESSORS: Worthington DC2, 29/18-1/2 x 21, motor 600 H.P. synchronous, 440 volt, with all auxiliary equipment. 4—Ingersoll Rand diesel portable, 500 cu. ft. @ 100 lbs. pressure, new 1951.
BLOWER: Connersville 8000 CFM, 1½ lbs., 18" x 54", type RCS, 75 H.P., 2200 volt, roller bearing motor and control. New 1951.
LOCOMOTIVE, ELECTRIC: 10 ton Goodman, trolley type, 250 D.C., 36" gauge.
SHOVEL, ELECTRIC: Bucyrus Erie 4 yd. capacity, 2200 volt.

A. J. O'NEILL
Lansdowne, Pa.
Phila. Phones: MAdison 3-8300—3-8301

ROTARY KILN, 6' dia. x 80' long, 24" d. x 18' l.
PULVERIZERS — WmsLC-1 & Raymond #1 w/cyclones Sturt #1 Ring Roll, Brad. Hero. Jr.
CRUSHING ROLLS—12x13, 16 x 10, 30 x 14, 48 x 16, 54 x 24.
CRUSHERS—JAW—6x9, 8x14, 14x36, 24x40
MILLS-HARDINGE — 7' x 48", 8' x 22" — w/motors
HYDRATOR—Lime-Kunts, continuous
CENTRIF. PUMPS—New—to 750 gpm—stock
DUMP CARS—100 side dump—24 ga, 1½ yd
TANK—8'x33' hor. steel—12,000 gal.
Exhausters, Compressors, Conveyors
FEEDERS—Jeffry 18"x48"—pan

LAWLER COMPANY
Durham Ave. Metuchen, N. J.
Metuchen 6-0245 N. J.

1—Complete Lime Hydrating Plant
Rotary Dryers—3' x 30'—4' x 30'—8' x 40'—5½' x 50'—6½' x 60'—8½' x 70' & 7½' x 79'.
Tube & Ball Mills—6' x 9'—5' x 22'—5½' x 18'.
Fuller-Lehigh Mills—22'—47' & 52'—Bradley Mills.
Jaw Crushers—From 10" x 6" up to 38" x 24".
Crushing Rolls—From 12' x 24" up to 72" x 20".
1—Complete Lime Hydrating Plant.
Sturtevant Rotary fine crushers—No. 0—No. 1—No. 1½ and No. 2.
Ring Roll Mills—Sturtevant No. 1—No. 2 duplex.
13'—16' & 18' Herreshoff furnaces.
Gyratory Crushers, No. 3 and No. 12.
5' & 8' Gayte — Air separators.
Magnetic separators—Jigs—screens—classifiers and thickeners.
5', 6' & 7' dia. Rod Mills. Mine Hoists.
8' x 18'—8' x 12'—11½' x 19' Rotary Filters.
1—6' Raymond "Whizzer" Separator.
New Dryers and Kilns.

W. P. HEINEKEN, INC.
50 Broad Street, New York

THICKENERS AND CONDITIONERS

1—20' x 10' Thickener Mechanism complete with steel superstructure, wood tank, motor and diaphragm pump

2—6' x 8' Conditioners, new wood tanks, steel superstructures — motorized

FLOTATION MACHINES

1—#24, 8-cell, Denver "Sub-A" Flotation Machine, 43" x 43" cells, wood tank, complete with motors and new rubber impellers

CRUSHERS

1—9 x 40 Austin-Western Jaw Crusher
1—10 x 20 A.C. Blake Crusher
1—6 x 12 Wheeling

HOISTS

1—#21½ Vulcan Sgl. Drum, with U-6 International Gas Power Unit. Condition like new
1—15 HP Box I. Wks. Sgl. Drum with 15 HP Slip-ring Motor
1—7½ HP Hoist with Motor

MISCELLANEOUS

1—18" Belt Conveyor, 35' long, complete with
1—Stromberg Metal Mine Phone
1—18" dia. x 26" Face Dings Mag. Pulley, 110 volts, with tail mechanism, drive & charger
1—Sullivan LW-6 Wagon Drill with Dry Drifter—on steel wheels
3—Gen. Eng. Wet Sample Cutters
2—2" Wilfley Sand Pump—rubber lined
1—20 HP Upright Boiler
1—32" x 16" F. M. Davis Crushing Roll
1—18" Denver Cone Reagent Feeder
1—30" x 48" Baker Ball Mill
1—50 Ton Truck Scale—44' platform
25 Tons 85# Relayers
10 Tons 65# Relayers
3 Tons 16" Rail
Enclosed Safety Switches
Revolving Screens
I.R. Motor Mounted Pumps—1 HP to 25 HP
Hydroseal Pumps
Deep Well Pumps

SEND FOR STOCK LIST

FLORENCE MACHINERY & SUPPLY CO.

Suite 904, Equitable Bldg. C. J. Parrish, Mgr. Denver 2, Colorado

IMMEDIATE DELIVERY

2—Bucyrus-Erie, Model 54B, HiLift Shovels, late series
1—Bucyrus-Erie, Model 120B, Electric Shovel
1—Lima, Model 1201, HiLift Shovel, late model
1—Lima, Model 2400, Shovel, 5½ yard, used 6 months
2—Manitowoc, Model 3500, HiLift Shovels
1—Marion, Model 40-A, HiLift Shovel
1—Marion, Electric Shovel, 8 yards
2—Marion, Electric Shovels, 4 and 5 yards
6—Euclid Trucks, 22 ton, 15 yard, Rear Dump, rebuilt
3—Euclid Trucks, 11 yard, Rear Dump, new 1951

AL J. GOODMAN
P. O. Box 263 • Asheville, N. C.
Day Phone, Asheville, N.C. 3-6456
Night Phone, Asheville, N.C. 5668

TWO MARION ELECTRIC SHOVELS

4 cu. yd.; Model 4160, 29' 8" boom, 21' 6" dipper, caterpiller mounted. M-G set operating on 2000 v, 60 cy. 3 ph.

$35,000 each where is, as is, Asbestos, Que.

For further details address
R. P. Shupper, P.A.,
Johns-Manville Corp.
22 East 40 St., New York 16, N. Y.
Phone: LEx. 2-7600

FOR SALE CRANE CABLE

#4 gauge 2 conductor round flexible 133 strand neoprene covered heavy duty portable cord. 150' lengths with connectors $75.00 each. Also available immediately from warehouse stock large quantities of other cords, mining machine, locomotive, welding and shovel cable. Cut to any length.

Universal Wire & Cable Co.
2700 Claybourn Ave., Chicago 14, Ill.
Eastgate 7-4777

FOR SALE

1) Johnston oil lubricated deep well turbine pump, rated 2500 g.p.m. water against 250 ft. total head with 240 ft. 12" dia. column, motor 200 HP., 440 volts, 3 phase, 60 cycles, one extra set of bowls complete. Pump had only 6 month service, purchased new in 1948.
1) 8" x 8" Allis-Chalmers single stage, split casing, horizontal centrifugal pump rated to deliver 1400 g.p.m. water against 248 ft. total head, complete with base and flexibly coupled 125 HP., 440 volt, 3 phase, 60 cycles, 1800 r.p.m. motor. Motor insulated to withstand excessive humidity. Pump has never been used, was purchased new in 1945.
2) Johnston deep well turbine pumps, complete each with 250 ft. of 10" column, and 125 HP., 440 volt, 3 phase, 60 cycle motors. One extra set of bowl assembly included. Each pump rated to delivery 1500 g.p.m. against 250 ft. head. Pumps in excellent shape. Have been used slightly over one year. Purchased new in 1947.
These pumps are located in Nicaragua, ready for immediate delivery.
COMPANIA MINERIA LA INDIA
Apartado 195, Managua, Nicaragua.

Rotary Kiln 7½' x 260' heavy duty.
Dryer 4' x 6' with intake and discharge housing, Ray oil burner, etc.
"Herreshoff" 10' Dia. 6-Hearth Furnace.
H. T. NEAL MACHINERY CO.
58 Sutter Street San Francisco

WANTED

We Buy CARBIDE TIPPED BITS

Ship now while scrap tungsten prices are still at the peak.

THE CHEM-MET CO.
1911 Kenilworth Avenue
Washington 19, D.C.
P.O. Box 5191
We pay the freight

QUARRY AND MILL OPERATORS

Used Jaw Crusher Wearplates approximately 3 by 4 feet or larger wanted by:
Warren Foundry & Pipe Corp.
P. O. Box 392, Dover, New Jersey
Telephone: Dover 6-0369

Wanted SMELTER

Give complete information.
W. O. Fillmore
Spearfish, S.D.

BUYERS OF SURPLUS COPPER, INSULATED WIRES AND CABLES

No lengths too long or too short.
Telephone: EAstgate 7-4778
PIERCE CABLE CO.
2674 Clybourn Ave., Chicago 20, Ill.

WANTED

Humphrey Spirals.
Advise location and price.
Temperature Control Corporation
336 Hudson Street
Hackensack, N. J.

An Investment!

Productive advertising is an INVESTMENT rather than an EXPENDITURE.

"Searchlight" advertisers almost invariably report prompt and satisfactory results.

BE CONVINCED — send us your advertisement TODAY.

Address Classified Advertising Division

ENGINEERING & MINING JOURNAL
330 W. 42nd St., New York 36, N. Y.

MOTORS—M. G. SETS—TRANSFORMERS

SQUIRREL CAGE MOTORS
3-Ph., 60-Cy.

Qu	HP	Make	Type	Volts	RPM
1	400	Cont.	NZ-806	2300	1200
1	400	G.E.	1K	2300	514
1	400	G.E.	KT-412	2200	435
1	300	Whse.	CS-690	2300	1750
1	200	Whse.	CS-873C	2200	1160
1	200	Al.Ch.	AR	440/220	580
2	125	Al.Ch.	AR	2200	1750
1	125	Whse.	CS-781C	440/220	1750
1	125	C.W.	126-Q	440/220	430
2	100	Whse.	CS-663C	440/220	1750
1	100	Al.Ch.	AR	550	690
1	100	F.M.	H241B	440/220	435
1	100	Whse.	CS-938	2300	495
1	75	G.E.	I-K15	440/230	570
1	75	Al.Ch.	AR	2200	1765
1	75	Al.Ch.	AR	2200	1750
1	75	Al.Ch.	AR	2200	690

SYNCHRONOUS MOTORS
3-Ph., 60-Cy.

Qu	HP	Make	PF	Volts	RPM
1	2500	Whse.	80	2300	720
2	2100	G.E.	100	2300	360
2	1750	G.E.	100	2300	3600
1	750	G.E.	80	2300	450
1	187	G.E.	80	220/440	720
1	150	G.E.	100	2300	900
1	150	G.E.	100	550/2200	600
1	150	G.E.	80	550/2200	450
3	135	G.E.	80	4000/2200	1200
3	125	El.Mchy.	100	4800/2400	900
1	125	G.E.	80	2200	900
2	100	Whse.	80	440/220	1800
1	100	Whse.	100	2200	1200
1	100	Ideal	80	220/440	900
2	100	G.E.	80	220/440	600
1	60	G.E.	80	220/440	1200
2	50	G.E.	80	2200	600

SLIP RING MOTORS—CONSTANT DUTY—3-Ph., 60-Cy.

Qu	HP	Make	Type	Volts	RPM
1**	1200	C.W.	6B	2200	237
2**	1000	Al.Ch.	ANY	2200	235
1**	600	G.E.	MT-20	2200	380
2	500	G.E.	I-10-M	2300	450
1**	400	Al.Ch.	ANY	2200	514
2	400	G.E.	MT-412	2200	450
1	300	G.E.	I-15-M	2200	1200
1	300	Al.Ch.	ANY	2200	514
1	250	G.E.	MT-414	2200	300
1	200	G.E.	I-16-M	2200	585
1	150	G.E.	I-13-M	2200	1750
1***	125	Whse.	CW-870	2200	870
1	100	F.M.	H200C	440/220	900
1	75	G.E.	1M	440/220	695
1	75	Whse.	CW-7540	440/220	690
1	60	Whse.	CW	440/220	900
1	50	G.E.	MT-536	2200	1150
1	50	F.M.	BR	440/220	600
1	40	Al.Ch.	ANY	2200/440	435

** Mill type pedestal bearing. *** 3-Bearing

In our stock you will find manual and magnetic primary and secondary controls 10 to 3000 lbs., which we can furnish complete for any requirements.

MOTOR GENERATOR SETS

Qu	KW	Make	RPM	Volts DC	Volts AC
1	2400(3-U)	Al.Ch.	720	525	4800
1	2400(3-U)	Whse.	720	600	4800/2400
1	1000	G.E.	514	550	2300
2	500	C.W.	720	575	2300/440
1*	500	C.W.	720	250/375	2300/440
1	500(3-U)	Whse.	1200	250	440
1	250	Whse.	1200	125/250	2300
1	200	Whse.	1200	125/250	2300/440
1	200	Ridgway	900	275	2200
1	188	G.E.	720	250	2300/440
1	150	G.E.	1200	500	2300/440
1	100	Al.Ch.	1200	125/250	4000/2300
1	100	Deico	1200	125/250	440/220
1	100	C.W.	1200	125	440/220
1	100	Ridgway	1200	275	4000/2300
1	85	C.W.	1200	250	4000/2300
1	75	Star	1200	230	440/220
1	35	Whse.	1750	250	440/220
1	25	Ideal	1750	125	220
3	20	Al.Ch.	1200	250	440/220

DIRECT CURRENT MOTORS

Qu	HP	Make	Type	RPM
1***	3000	Whse.	Encl.(Rev.)	600
1***	2400	Whse.	Encl.(Rev.)	600
4***	1800	Whse.	Encl.(Rev.)	600
4***	1200	Whse.	Encl.(Rev.)	600
4***	800	Whse.	Encl.(Rev.)	600
1	350	G.E.	CD-169-A	1150
1	300/250	El.Dy.	No. 22	400/1200
1	250	G.E.	MPC	325/975‡
1***	200	G.E.	MPC	500/1200
1	200	Whse.	Mill	200/1200
1	180	G.E.	MPC	400
1*	150	C.W.	83-H	890
1***	125	Whse.	8K-190	600
3	125	Whse.	8K-184	575/850
1	100/125	Rel.	1905-P	300/1200
2	100	Rel.	1055-P	400/1200
1	90/100	G.E.	MPC	625/1125

All above 230-VDC except where marked ***.
*** Pedestal bearing mill design 525/600-VDC.
Rev. designed for mill reversing service.
* T.E.F.C.

We have in stock 100 magnetic panels which we can furnish arranged for your particular requirements.

FREQUENCY CONVERTER SETS

Qu		Make	
1	750-KVA	Elec.Mchy.	440/3/60 to 440/3/180
2	1200-KW	G.E.	2300/3/60 to 460/3/30
1	1700-KVA	Whse.	2300/3/60 to 2500/3/24

The above complete with control panels and starting equipment.

TRANSFORMERS—Power

Qu	Make	KVA	Type	Phase	Voltage
1	G.E.	2760	DH	3	7300/6900-240/480
4	G.E.	333	H	1	13200/1100-2200
3	Packard	250	A	1	13200-2200
3	G.E.	100	H	1	33000-2300
3	Whse.	100	SS	1	12075/10955-230/460
3	Whse.	100	Auto		4160/2400-2400/1385
3	Al.Ch.	50	OISC	1	22000-220
2	Uptegraff	37½	HD		2300-115/230
2	Kyhiman	13	Dry	1	480-240
4§(new)	Al.Ch.	3	OISC	1	2400-120/240

T. B. MAC CABE COMPANY

4510 CLARISSA STREET — Phone DAvenport 4-8300 — PHILADELPHIA 40, PENNA.

Steel Tunnel Ribs

467 — Fabricated Steel Columnar Arches (2 bolted halves matching face plates).

11' 5" to top of arch 10' across north 5/8" x 10" x 10" ft. plates. Drilled for tie rods 6" 20# H column wt. 648# each arch. Virtually new, suitable for mines, tunnels, shoring, reinforcing for structural purpose. Detailed drawing and price on application.

Luria Brothers and Company, Inc.
Equipment Division
Lincoln Liberty Building, Phila. 7, Pa.
Phone Rittenhouse 6-7455

TUNNEL EQUIPMENT

ELECTRIC LOCOMOTIVES
with extra batteries
3—Whitcombs, 10 Ton, 36" Gauge
6—Greenburgs, 11 Ton, 36" Gauge

MUCKING MACHINES
3—Eimco Rockershovels, Model 40
4—Conway Muckers, Model 75

CARS
38—5 Cu. Yd. Side Dump, 36" Gauge.

MISCELLANEOUS
2—Roots-Connersville Blowers, 7300 c.f.m.
3—40 K.W. Battery Charging Units
2—20 K.W. Battery Charging Units
16—Ingersoll-Rand DA35, wet type, Drifter Drills
24—Ingersoll-Rand S70 Motor Feed Drifters
10—Ingersoll-Rand No. 229D-1B Drill Booms
12000 lineal feet 24" Vent-Pipe, 14 Ga. Lock Joint
2—60 K.W. Diesel Generator Sets
Transformers, various sizes
Electric Cable
Electric Pumps, various sizes

SUBJECT TO PRIOR SALE

FRAZIER-DAVIS CONSTRUCTION COMPANY

1319 Macklind Ave. St. Louis 10, Mo. STerling 1950
Grahamsville, New York Box 153 Grahamsville 2861

HL-20 LOADER
JOY (SULLIVAN) HL-20
2 TONS PER MINUTE
Guaranteed 85% New

CENTRAL CONTRACTORS SERVICE, INC.
GEORGE A. CARLSON, Pres.
1150 N. North Branch St. Chicago 22, Ill.

RELAYING RAIL
All Sizes
Track Accessories
LEFTON INDUSTRIAL CORP.
Genl. Office: 212 Victor St.
St. Louis 4, Mo.

FOR SALE
Bucyrus 29-T Blast Hole Drill
Drilled only 3000 feet
Priced to go
Reason for selling—
No longer needed
Contact: J. C. Merrington
Box 728, Anchorage, Alaska

MOTORS, GENERATORS, TRANSFORMERS
1 - 1500 H.P.
Bought and Sold
New and Rebuilt
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N. Y.

DREDGE FOR SALE

An All-Steel Bucket Dredge 176 ft. x 75 ft. x 13 ft. Fully equipped for gold saving.
Capacity up to 450,000 cubic yards per month.
Digging depth 52 feet at 50 degrees ladder angle. Entirely electrically driven.
In splendid order and complete with many spares and accessories. Dredge is at present operating in New Zealand.
Further particulars from:—

F. W. Payne & Son,
34 Southborough Road,
Bickley, Kent,
England.

ALPHABETICAL INDEX TO ADVERTISERS

Where an asterisk * precedes manufacturer's name, more detailed infor mation may be found in the *1951-52 edition of the Mining Catalog*. (This index is published as a convenience to the reader. Every care is taken to make it accurate, but E&MJ assumes no responsibility for errors or omissions.)

*Acker Drill Co., Inc. 156
Aero Service Corporation 144
*Allen-Sherman-Hoff Pump Co.... Second Cover
*Allis-Chalmers Mfg. Co. (General Mchry Div.) ..... 37, 51, Third Cover
*Allis-Chalmers Mfg. Co. (Tractor Div.) 34, 35
American Brass Co. ..... 34(b)
*American Air Filter Co. Inc. 160
*American Cyanamid Co. ..... Insert Between pp. 34, 35
American Hoist & Derrick Co. 197, 205
*American Manganese Steel Div. (American Brake Shoe Co.) 30
*American Mine Door Co. 195
Anaconda Copper Mining Co. ..... 34(b)
Armstrong-Bray & Co. 154
*Atlas Car & Mfg. Co. 134
Atlas Powder Co. 61

*Baldwin-Lima-Hamilton Corp., Lima Hamilton Div. 175
*Bethlehem Steel Co. 33, 58
*Birdsboro Steel Fdry & Machine Co. 158
Booth Engineers 196
Boston Woven Hose & Rubber Co. 45
Brunner & Lay, Inc. 156
Bucyrus-Erie Co. 31, 150
Buda Company 184
*Buell Engineering Co. 166
Bullard Co., E. D. 156

*California Wire Cloth Corp. 152
Carborundum Co. (Refractories Div.) 22, 23
*Card Iron Works Co., C. S. 138
*Carlon Products Corp. 174
Carlyle Rubber Co., Inc. 135
Caterpillar Tractor Co. 19
*Chicago Pneumatic Tool Co. 187
*Christensen Diamond Products Co. 130
Cleveland Vibrator Co. 139
*Colorado Fuel & Iron Corp. 152
*Collyer Insulated Wire Co. 192
*Coppus Engineering Corp. 159
*Crane Co. 28
Crucible Steel Co. of America 116

*Dart Truck Co. 195
*Denver Equipment Co. 126, 127, 128, 129
*Detroit Diesel Engine Div. General Motors 181
*Dings Magnetic Separator Co. 36
Dodge Manufacturing Corp. 10, 11
*Dorr Company 111, 113
Dow Chemical Company 42, 43
du Pont de Nemours & Co., E. I. (Explosives Div.) 191

*Edison Storage Bat. Div., Thos. A. Edison, Inc. 137
*Eimco Corporation 25
*Electric Storage Battery Co. 107
Engineers Syndicate, Inc. 200
*Euclid Road Machinery Co. 161

Farval Corporation 155
Filter Fabrics, Inc. 147
Flexible Steel Lacing Co. 196
Flexible Valve Corporation 202

Galigher Co. 131
*Gardner-Denver Co. 14
Gates Rubber Co. 34
Georgia Iron Works 142
*General Electric Co. 46, 47, 54
General Tire & Rubber Co. 157
Godoy & Co., Inc., E. A. 143
*Goodman Manufacturing Co. 29
Goodrich Company, B. F. 4
Goodyear Tire & Rubber Co. 21, 24
Gould-National Batteries, Inc. 170

*Hardinge Co., Inc. 132, 133
Harnischfeger Corp. 35
Hazard Wire Rope Div., American Chain & Cable 172
Heil Company 201
*Hendrick Manufacturing Co. 199
Hewitt-Robins, Inc. 48, 49
Hose Accessories Co 147
Hough Company, Frank G. 176
Hyster Company 179

Industrial Brownhoist Corp. 185
*Ingersoll-Rand Co. 3
International Harvester Co. 40
International Nickel Co. 168

*Jeffrey Manufacturing Co. 165
Johnson, C. S. 12, 13
*Jones & Laughlin Steel Corp. 169
*Joy Manufacturing Company 8, 9, 57

*Kennedy-Van Saun Mfg. & Engr. Corp. 38, 39
Koehring Company 12, 13
Kysor Heater Co. 163

Laplant Choate Mfg. Co., Inc. 115
*Laughlin Company, Thomas 148
LeRoi Company (Cleveland Div.) 62
LeTourneau Inc., R. G. 26, 27
*Lipmann Engineering Works 178
Ledcen Mfg. Co. 192
*Lufkin Rule Company 200

Mace Company 134
Macwhyte Company 186
*Mancha Storage Battery, Locomotive Div., Goodman Mfg. Co. 29
Manhattan Rubber Div., Raybestos Manhattan 59
Marion Power Shovel Co. 190
Mayo Tunnel & Equipment Co. 199
*Merrick Scale Mfg. Co. 154
*Morris Machine Works 141
McGraw Hill Book Co. Inc. 197

Nagle Pumps, Inc. 203
*National Malleable and Steel Castings Co. 193
*National Filter Media Corp. 140
*Naylor Pipe Co. 135
New York Engineering Co. 205
*Nordberg Manufacturing Co. 52
Northwest Engineering Co. 15
Ohio Brass Co. 65
*Oliver United Filters, Inc. 171
*Osmose Wood Preserving Co. of America 143

Parsons Co. 12, 13
Pennsylvania Drilling Co. 199
Philadelphia Quartz Co., Inc. 200
Pittsburgh Lectromelt Furnace Corp. 194
Portland Woolen Mills, Inc. 183

Quick-Seal Products, Inc. 205

Radiac Company, Inc. 205
Raybestos-Manhattan, Inc. 59
*Republic Rubber Div. of Lee Rubber & Tire Corp. 63
Robins-Conveyors Div., Hewitt-Robins, Inc. 48, 49
Rockbit Sales and Service Co. 198
Roebling's Sons Co., J. A. 188, 167
Rogers Iron Works Co. 182
Rollway Bearings Co. 177
Ryerson & Son, Inc., J. T. 109

*Sanford-Day Iron Works 180
*Sauerman Bros. 151
Searchlight Section 206, 209
Shafer Bearing Corp. 201
*Simplex Wire & Cable Corp. 55
Simplicity Engineering Co. 198
*Sintering Machinery Corp. 152
*Skookum Co., Inc. 136
Smit & Co., Anton 199
*Smit & Sons, Inc., J. K. 203
*Sprague & Henwood, Inc. 138
Standard Oil Co. of Cal. 189
Stephens-Adamson Mfg. Co. 41
*Sturtevant Mill Co. 60
Syntron Company 124

Taylor-Wharton Iron & Steel Co. 148
Texas Company 6, 7
Texas Gulf Sulphur Co. 162
*Thermoid Company 173
*Thomas Flexible Coupling Co. 149
Thew Shovel Co. 145

Throwaway Bit Corporation 56
*Timken Roller Bearing Co. ..... Fourth Cover
*Traylor Engineering & Mfg. Corp. 18, 20

United States Rubber Co. 120

Victaulic Co. of America 146
*Vulcan Iron Works Co. 64

Walworth Company ..... 34(a)
Warren Foundry & Pipe Co. 153
*Wedge Wire Corporation 147
Western Machinery Co. 118
Western Precipitation Corp. 53
Western-Knapp Eng. Co. 32
Western Rock Bit Mfg. Co. 50
*Wheel Trucing Tool Co. 44
*Wickwire-Spencer Steel Div. 152
*Wilfley & Sons Co., Inc., A. R. 66
Windsor & Co., Ltd., H. 203

Yardley Plastics Co. 164
Yuba Manufacturing Co. 205

PROFESSIONAL SERVICES 204

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Manager

EMPLOYMENT
Positions Vacant 206
Selling Opportunities Offered 206
Positions Wanted 206

SPECIAL SERVICES
Contract Work 206

EDUCATIONAL
Books 206
Periodicals 206

BUSINESS OPPORTUNITIES
Offered 206

PROPERTY
For Sale 206
Wanted 206

EQUIPMENT
(Used or Surplus New)
For Sale 206, 209
Rail 209

WANTED
Equipment 208
Miscellaneous 206

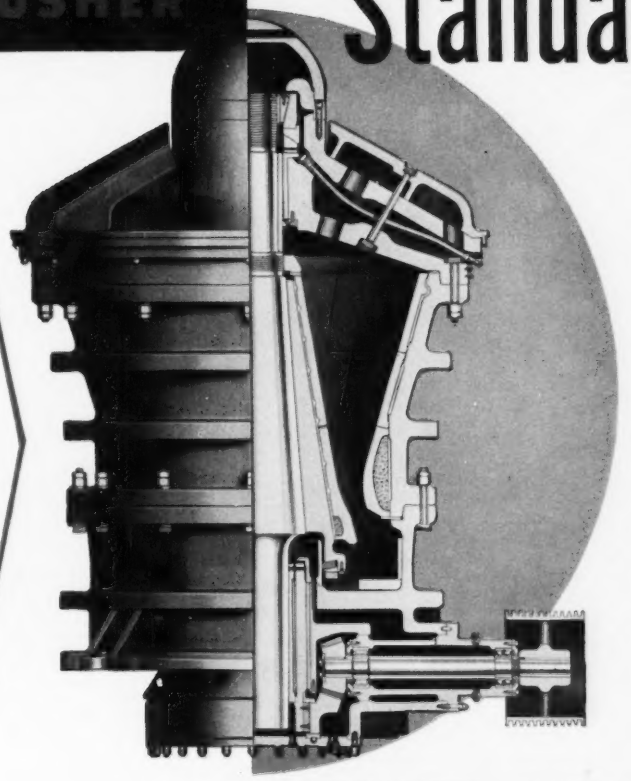
ADVERTISERS INDEX

Central Contractors Service, Inc. 209
Chem-Met Co. 208
Compania Minera La India 208
De Flora, C. August 208
EIMCO Corp. 206
Electric Equipment Co. 209
Fillmore, W. O. 208
Florence Machinery & Supply Co. 208
Frazier-Davis Construction Co. 209
Goodman, Al. J. 208
Harris, J. Henry 206
Harvey Machine Co., Inc. 207
Heineken Inc., W. P. 207
Johns-Manville 208
Lawler Company 207
Lefton Industrial Corp. 209
Luria Brothers & Co., Inc. 209
MacCabe Co., T. B. 209
Merrington, J. C. 209
Morse Brothers Machinery Co. 207
Neal Machinery Co., H. T. 208
O'Neill, A. J. 207
Payne & Son, F. W. 209
Pierce Cable Co. 208
Rocks & Minerals 206
Stanhope Inc., R. C. 207
Universal Wire & Cable Co. 208
Warren Foundry & Pipe Corp. 208
Williams, R. R. 206
Box 1231 206
CW 1319 206
RW 1908 206
SW 3116 206

Setting

New Crusher Standards

SUPERIOR
Primary & Secondary
CRUSHER



Improved lubrication throughout, including spider.

Sturdy all-steel construction . . . with heavy external ribbing.

Greater operating flexibility than any comparable crusher. Eccentric setting and speed can be varied to suit your capacity requirements.

More effective dust seal.

Vertical adjustment compensates for wear and maintains uniformity of product by means of adjustable spider suspension or *Hydroset* control. This hydraulic control permits quick product size setting and makes it easy to clear crushing chamber after shutdown.

Easy-to-replace, long life bearings.

Free-fall discharge.

THE *SUPERIOR* CRUSHER — with all these important features — requires fewer manhours to maintain . . . results in less shutdown time . . . less in the way of maintenance. And, whether on primary or secondary crushing, it will produce these savings for years to come. The A-C representative in your area will give you complete, detailed information. Call him, or write: Allis-Chalmers, Milwaukee 1, Wisconsin. A-3648

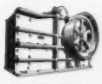
Superior and *Hydroset* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

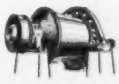
A-C ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Hammermills


Jaw Crushers

Gyratory Crushers


Grinding Mills

Vibrating Screens

Kilns, Coolers, Dryers

When are carbide insert bits best?

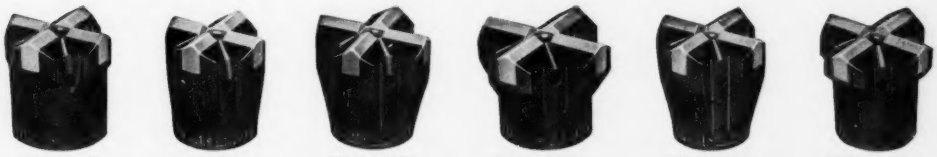
WHEN you run into drilling conditions like those listed below, you need carbide insert bits. Because carbide insert bits drill longer without sharpening, drillers spend less time changing bits. Crews can spend more time drilling. Bit reconditioning is simplified. And since carbide insert bits hold their gauge better, you can bottom the hole in the desired size without having to remove excess rock.

1. Extremely deep holes
2. Very hard ground where a steel bit will not drill out a full increment of drill steel.
3. Small blast holes
4. Constant gauge holes
5. Extremely abrasive ground
6. Block hole drilling in hard ground
7. Raise mining where space is limited
8. Locations where transportation and reconditioning of bits are problems.

What's the best carbide insert bit to buy?

TO be certain of getting the best carbide insert bits, look for the trade-mark "Timken" on the bits you buy. Timken® carbide insert bits are removable, screw on or off the drill steel easily. Driller is assured of sharp, uniform bits at all times without exchanging entire drill steel. And he can conveniently carry a full day's supply of bits.

You'll get more service from your Timken carbide insert rock bits because the bit body is made from electric furnace Timken steel. And because of the special shoulder union developed by the Timken Company, threads are not subjected to drilling impact. Timken carbide insert bits are available in six series. Our Rock Bit Engineering Service will help select the right one for your job. The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



"SC" SERIES (¾" thread) | "FC" SERIES (⅞" thread) | "MC" SERIES (1" thread) | "MCA" SERIES (1" thread) | "DC" SERIES (1⅛" thread) | "DCA" SERIES (1⅛" thread)

TIMKEN ***REMOVABLE ROCK BITS***

TRADE MARK REG. U.S. PAT. OFF.